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PRELIMINARY ASSESSMENT ADDENDUM
AREA OF CONCERN 1
NAVAL WEAPONS STATION, SEAL BEACH DETACHMENT CONCORD

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ACRONYMS AND ABBREVIATIONS

AOC	Area of Concern
BAF	Bioaccumulation factors
CCWD	Contra Costa Water District
CLEAN	Comprehensive Long-term Environmental Action Navy
COPC	Chemicals of potential concern
COPEC	Chemicals of potential ecological concern
CSM	Conceptual site model
CTO	Contract Task Order
cy	Cubic yards
EFA WEST	Engineering Field Activity West
EPA	U.S. Environmental Protection Agency
ERA	Ecological risk assessments
ft bgs	Feet below ground surface
ft^2	Square foot
HHRA	Human health risk assessment
HQ	Hazard quotient
LMW	Low molecular weight
LOEC	Lowest observed effects concentration
mg/kg	Milligrams per kilogram
NCP	National Contingency Plan
NWSSB	Naval Weapons Station Seal Beach
ORNL	Oak Ridge National Laboratory
PA	Preliminary assessment
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated biphenyls
PRG	Preliminary remediation goals
PSC	Protective soil concentrations
SLERA	Screening-level ecological risk assessment
SUF	Site use factor
SVOC	Semivolatile organic compounds
TRV	Toxicity reference values
TtEMI	Tetra Tech EM Inc.
UCL_{95}	95percent upper confidence limit
VOC	Volatile organic compounds

EXECUTIVE SUMMARY

Area of Concern 1 (AOC 1) is an undeveloped 17.2-acre parcel located north of Port Chicago Highway, east of the Litigation Area at Naval Weapons Station Seal Beach Detachment (NWSSBD) Concord. The site is the former location of a nitrogen-phosphorus-potassium (N-P-K) fertilizer plant operated by Union Oil Company of California. The facility operated from 1955 to 1976, and the Navy acquired the property in 1983 to expand the aerial safety buffer for munitions handling at Pier 4. All buildings at the site were demolished and removed from the site in 1986. The property is currently vacant and is secured by a locked perimeter fence. Potential contamination at AOC 1 came to the attention of the U.S. Navy (Navy) when the Contra Costa Water District (CCWD) installed a pump station at the site in 1998. Sampling conducted to determine appropriate options to dispose of excavated soil showed that the soil contained wastes that were contaminated with lead, mercury, and selenium.

The Navy conducted a preliminary assessment (PA) at AOC 1 in two phases. The first phase, conducted in February 1999, consisted of reviewing agency files regarding the site and collecting 17 soil samples at 9 locations at the site. The first phase of the PA revealed that the soil contamination affected a larger area than originally suspected, and a screening-level ecological risk assessment showed that contaminants pose an unacceptable risk to ecological receptors. To delineate the extent of contaminated materials at AOC 1 and to further refine the assessment of ecological risk at AOC 1, the Navy conducted a supplemental PA investigation in July 2000, and collected 79 additional soil samples and performed a more detailed ecological risk assessment. This document describes results of the second phase of the PA investigation at AOC 1.

The two phases of the PA investigation revealed that the site contains several types of waste materials, including (1) cinder roadbed material, (2) ash-like material, and (3) other wastes in bare soil areas. Human health risks associated with contaminants present in these waste materials were assessed using a screening level approach by comparing contaminant concentrations with EPA Region IX PRGs for industrial soils. Maximum lead concentrations at the site exceeded industrial PRGs and cumulative cancer risks for industrial workers slightly exceeded EPA's target risk range. Actual human health risks at the site are mitigated because (1) site access is restricted and workers visit the site only for occasional maintenance, and (2) waste materials at the site are typically covered by vegetation and/or several inches of topsoil.

Ecological risks associated with these wastes and contaminated soils at the site were evaluated through a screening level ecological risk assessment (SLERA) and a more focused ecological risk assessment (ERA). The SLERA evaluated risks to plants and invertebrates by comparing soil concentrations to Oak Ridge National Laboratory (ORNL) benchmarks. The SLERA indicated risk to plants and invertebrates because soil concentrations exceeded both the ambient concentrations and ORNL benchmarks. The SLERA evaluated risks to vertebrate receptors by food-chain modeling using assumptions recommended by EPA and Navy guidance (EPA 1999a; Navy 1999a) to model risk to three representative receptors: the Western Meadowlark, the Northern Harrier, and the gray fox. The SLERA indicated unacceptable risks to the three representative vertebrate receptors. Several hazard quotients derived by the SLERA food-chain modeling were relatively high. For example, a hazard quotient of 261 was estimated for selenium by comparing the Western Meadowlark's typical daily dose to the high toxicity reference value. The SLERA indicates that metals concentrations in waste materials at AOC 1 pose unacceptable ecological risk.

Therefore, the Navy, as lead agency, has determined that the appropriate action for AOC 1 is to implement a time-critical removal to promptly address ecological risks associated with metals in soil and waste material at the site. A time-critical (as opposed to a nontime-critical) removal action is justified because a planning period of less than 6 months is necessary to protect human health and the environment (40 CFR 300.415[b][4]).

To refine the risk estimates for vertebrates at AOC 1, the Navy conducted a more focused ERA using more realistic site- and receptor-specific assumptions. The focused assessment used UCL_{95} soil concentrations rather than maximum soil concentrations, accounted for bioavailability of chemicals in food items, and used literature-reported foraging ranges for the modeled receptors. Based on the more realistic set of assumptions in the food chain modeling, risks were substantially lower than those estimated by the SLERA; however, mercury and selenium still posed unacceptable risk to the Western Meadowlark.

To promptly address unacceptable ecological risks at AOC 1, the Navy intends to pursue a debris- and hot spot-based time-critical removal action. Mercury and selenium are strongly associated with cinder waste material and with two hot spots in the northeast and north-central parts of AOC 1. Accordingly, the Navy intends to excavate and properly dispose of waste materials that contain high concentrations of mercury and selenium to reduce ecological risks at AOC 1. Areas where cinder material is present and where hot spots have been identified in the waste materials in the eastern half of the site are illustrated in Figure 11. Soils from these areas should be excavated and removed from the site to reduce risks to ecological receptors, and the excavations should be refilled with uncontaminated soils to restore the original grading of the site and to reduce any potential residual risks from soils left in place in the removal areas. Assuming the areas shown on Figure 11 are excavated to a depth of 2 feet below grade, an approximate volume of 4,700 cubic yards of material would require excavation and removal from the site as part of a removal action.

1.0 INTRODUCTION

Tetra Tech EM Inc. (TtEMI), formerly known as PRC Environmental Management, Inc. (PRC), has prepared this preliminary assessment (PA) addendum for the Naval Facilities Engineering Command under the Comprehensive Long-term Environmental Action Navy (CLEAN) Contract No. N62474-94-D-7609 (CLEAN II), Contract Task Order (CTO) No. 267. The overall purpose of CTO No. 267 is to conduct a PA of AOC 1 to determine whether the site warrants further investigation under the Navy's Installation Restoration Program. This PA addendum presents the results of additional sampling conducted to complete the PA at Naval Weapons Station Seal Beach Detachment Concord (NWSSB Detachment Concord) Area of Concern (AOC) 1 during July 2000.

AOC 1 is a parcel of vacant land near the eastern boundary of Naval Weapons Station Seal Beach Detachment (NWSSBD) Concord. Potential contamination at AOC 1 came to the attention of the U.S. Navy (Navy) when the Contra Costa Water District (CCWD) installed a pump station at the site in 1998. Sampling conducted to determine appropriate options to dispose of excavated soil showed that the soil contained wastes that were contaminated with lead, mercury, and selenium.

A PA was conducted in January and February 1999 to investigate the pump station area and several piles of waste materials shown on aerial photographs (TtEMI 1999a). The PA showed that although currently vacant, the site formerly contained a large fertilizer production plant. The fertilizer plant and other site features are shown on an aerial photograph from 1974 (Figure 1). The PA also established that the area affected by contamination was considerably larger than originally estimated and that metals concentrations in several waste types at the site are high. For example, mercury was detected at a concentration of 113 milligrams per kilogram (mg/kg) in one near-surface waste sample. Preliminary food chain modeling, based on maximum concentrations and conservative assumptions, showed that selenium and mercury pose an unacceptable risk to ecological receptors at the site, but that human health risks are within the acceptable range of exposure defined by the U.S. Environmental Protection Agency (EPA). Although lead concentrations in waste materials exceeded the preliminary remediation goal (PRG) for industrial soils, risks associated with exposure to this lead are mitigated by the current actual site use, where workers are present a few hours per month at most. In addition, the lead is associated with a discrete layer of cinders, which is buried by 6 or more inches of soil. The Navy intends to perform a removal action at the site to address risk to ecological receptors. Additional sampling described in this PA addendum was conducted to fill data gaps, respond to regulatory concerns about the site, and estimate the volume of material requiring removal. Because of the high concentrations of metals encountered at the site, the Navy anticipates that a time-critical removal action will be warranted.

To complete the PA of the site, TtEMI conducted additional exploratory drilling, sampling, and analytical work to accomplish the following specific objectives:

Objective 1: Evaluate the lateral and vertical extent of unconsolidated cinder roadbed material near the pump station.

Objective 2: Confirm detected concentrations of chemicals in the ash-like material at the former gypsum pile area, determine the lateral and vertical extent of the waste, and determine whether mercury is leaching from the material to lower soil horizons.

Objective 3: Sample and delineate the remaining barren soil areas that were not investigated during the original PA investigation.

Objective 4: Investigate the southwestern part of the site to determine whether wastes are present.

Objective 5: Conduct screening-level human health and ecological risk evaluations of the waste materials not previously screened.

Sections 2.0 through 5.0 of this report present each objective, along with field work completed, analyses conducted, and conclusions of the investigation. The screening level human health risk and ecological risk assessments (HHRA and ERA) are presented in Sections 6.0 and 7.0, respectively. Because the site is primarily driven by ecological risk, the ERA is much more detailed than the HHRA. Conclusions and recommendations for further action at the site are presented in Section 8.0. Tables and figures cited in this report follow the reference section.

2.0 DELINEATION OF CINDER ROADBED MATERIAL

To accomplish objective 1, delineation of the lateral and vertical extent of the cinder roadbed material, TtEMI drilled 21 boreholes (GB01 to GB18 and GB53 to GB55) in the south central portion of the site at locations illustrated in Figure 2. The cinder roadbed material appeared to be related to a former vehicle turn-around area shown on the aerial photograph from 1974 (Figure 1).

The 1974 aerial photograph shows a truck scale, an elliptical roadway scored by vehicle tires, and a parking area, which are collectively referred to as the "vehicle turn-around area." The cinder roadbed material is a dark purplish-gray to black, vitreous, vesicular, fine to medium gravel (see Figure 3) that is easily distinguished visually from site soils, which are predominantly silt and clay. The material was analyzed for metals and other contaminants during several previous investigations at the site, as described in the original PA investigation report (TtEMI 1999a), which confirmed earlier analytical results. The field work conducted during this additional phase of the PA focused, therefore, on evaluating the lateral and vertical extent of the material.

Field Methods: Field work was conducted from July 19 to 28, 2000, using field methods described in the sampling and analysis plan (TtEMI 2000). Twenty-one borings were advanced in the vehicle turn-around area and in the area east of the vehicle turn-around. Borings were advanced to a depth of 6 feet below grade using a Geoprobe® direct push soil sampling method. Soils were examined visually and described on lithologic logs (included as Appendix A). Lithologic samples were containerized for later disposal. Based on the presence of cinder material in the easternmost soil borings in the easternmost part of the turn-around area, the area of investigation was extended further to the east

Results: The lateral and vertical extent of the material is described in the following text and illustrated in Figure 2. The vertical extent of the material is also noted on the lithologic logs included as Appendix A.

The cinder roadbed material is present in an irregularly shaped area that encompasses the southeast and east-central portion of the former vehicle turn-around area and extends to the east in two spots outside the turn-around area. The cinder material was not detected in several borings that are clearly within the vehicle turn-around shown on the 1974 aerial photograph, including boring GB07 in the center of the area. Because the cinder roadbed material does not coincide with the turn-around area shown in the photograph, the material may be temporary paving material that was used before the more well-defined turn-around area was established. Earlier aerial photographs are not of sufficient resolution to discern whether the cinder material was used as roadbed before the vehicle turn-around was established (TtEMI 1999a).

The cinder roadbed material was detected at depths ranging from near surface (0.15 to 0.5 feet below ground surface [bgs]) to deeper intervals (4.75 to 5.0 feet bgs). The samples detected at depths below 2.5 feet bgs are located beneath the CCWD pump station pad, an elevated wedge-shaped gravel structure upon which the pump station rests. The elevated pump station pad that was constructed in 1998 is made of tightly compressed gravel and sand that rises to a height of approximately 5 to 8 feet above the nearby ground surface.

The portion of the cinder material that is not beneath the elevated pump station pad has an estimated area of 16,750 square feet (ft^2). The cinder material and the overlying soils have an estimated volume of approximately 1,150 cubic yards (cy).

The cinder roadbed material has been delineated in sufficient detail. The cinder roadbed material forms a continuous layer in the eastern part of the vehicle turn-around area and adjacent area, which is surrounded by borings in which the material was not detected. The material forms a thin (less than 6-inch-thick) layer in an area of approximately 28,000 ft^2 or approximately 0.65 acres. Approximately 1,150 cy of material (including overlying soils) would require removal if all of the roadbed material was removed, excluding the area currently covered by the raised pump station pad. The pump station pad is an elevated mound of tightly packed gravel which is devoid of vegetation, and the cinder material is buried more than 2 feet beneath most of the pad. It is unlikely that burrowing mammals would be exposed to the cinder material beneath the pad; therefore, the cinder material beneath the pad is not considered to pose an ecological risk, and removal of the material is unnecessary. Although previous sampling (see Table 2, TtEMI 1999a) has shown that the cinder roadbed material does not leach appreciably to underlying soils, confirmation samples will be required to confirm that leaching has not occurred throughout the footprint of the cinder material.

3.0 DELINEATION OF ASH-LIKE MATERIAL IN EASTERN HALF OF SITE

The nitrogen-phosphorus-potassium (N-P-K) fertilizer production process historically used at the site generated large quantities of gypsum ($CaSO_4$) as a by-product. Because a historical aerial photograph showed large piles of waste in the northeastern quadrant of the site, a sample of waste material was collected in the middle of the area formerly covered by the piles. The sample was analyzed for metals during the original PA in February 1999 to determine whether metals were associated with the waste piles. The piles of material shown on aerial photographs are presumed to be gypsum because gypsum is the primary by-product of N-P-K fertilizer production and because site records show that the material was used as a soil amendment in California's Central Valley. Analytical results from the waste sample showed, however, that the material was not gypsum; pure gypsum would be expected to consist of approximately 46 percent calcium by weight, but the material that was tested consisted of slightly more than 1 percent calcium. The sample also contained high concentrations of mercury (113 mg/kg) and lead (895 mg/kg).

Because the waste material detected in this sample is not a remnant of the waste gypsum piles but is instead a different waste, 27 soil borings (GB26 through GB 52, Figure 4) were advanced on a 100-foot by 100-foot grid established over the entire eastern half of the site (rather than the former gypsum pile area alone). Because the waste material from the center of the gypsum pile area did not consist of gypsum and therefore could not be linked to the gypsum piles that occupied the northeast quadrant of the site, the entire eastern half of the site was investigated to determine the lateral extent of this material. The only other areas of the site that were not occupied by buildings and could have contained the wastes were investigated in the original PA (northwest corner) or as a separate part of this investigation (See Section 5.0 below).

Field methods: The ash-like materials in the former gypsum pile area were characterized by drilling 6-foot boreholes in 27 locations (borings GB-26 through GB-52) on a 100-foot by 100-foot grid over the entire eastern half of the site (Figure 4). Subsurface obstructions encountered in the east central part of the site did not allow advancement of Geoprobe® borings. In most cases, borings were relocated nearby and successfully advanced to 6 feet, but samples were not collected at locations GB-40 and GB-41 because subsurface obstructions did not allow Geoprobe® sampling at the originally proposed boring location or at two other nearby locations. Locations where borings were not completed because of refusal at shallow depths are indicated on Figure 4 by a red circle with a slash.

Wastes in the eastern half of the site are fine-grained white, powdery materials (see Figure 3) that are easily distinguished visually from site soils. Soil and waste samples from a boring were submitted for chemical analysis only if waste materials were encountered in the boring. At all locations where wastes were encountered, the waste material, the soils that lie immediately beneath the material, and the soils that lie approximately 2 feet beneath the base of the waste material were analyzed. In several locations (GB-27, GB-30, and GB-35), wastes were encountered at multiple depths; samples of waste and underlying soils were analyzed at these locations. Samples of waste material and underlying soils from five locations were analyzed for a full suite of contaminants (metals, volatile organic compounds [VOC], semivolatile organic compounds [SVOC], pesticides, polychlorinated biphenyls [PCB], and herbicides) to characterize the waste material. Samples from all locations were analyzed for metals and VOCs. VOC samples were collected with EnCore™ sampling devices in accordance with EPA method 5035. Because EnCore™ sampling devices were not available at the beginning of the field project, boreholes were advanced immediately adjacent to existing boreholes to collect VOC samples in some cases.

Results: The waste materials are considerably more widespread than anticipated and are present at most locations in the eastern half of the site. Wastes were encountered in 23 of 25 locations tested. Wastes were typically encountered within the upper foot, but were also encountered at a few locations at depths of up to 5 feet below grade (for example borings GB-27 and GB-30). It is possible that the wastes encountered at 5 feet were shallower materials that sloughed into the borehole during sampling; however, the lithologic logs note that white crystalline veinlets (See Figure 3) were encountered in a few locations (for example, GB-27), suggesting that at least some of the waste materials encountered at depth were in situ rather than material that fell through the borehole or annulus of the sample tube to deeper depths during sampling.

Analytical results for these samples are presented in Table 1, and materials encountered are noted on the lithologic logs contained in Appendix A. The analytical results show that several locations in the gridded area on the eastern half of the site (Figure 4) are contaminated by high concentrations of lead (933 mg/kg), zinc (1,010 mg/kg), and to a lesser extent selenium (68.3 mg/kg), mercury (21.4 mg/kg), and cadmium (64.9 mg/kg). Most samples were analyzed for VOCs, but only very low concentrations (up to 5 micrograms per kilogram [µg/kg], estimated) of toluene and 4-methyl-2-pentanone were detected. A subset of the samples from the eastern half of the site was analyzed for pesticides, PCBs, and SVOCs. Pyrene was ubiquitous at concentrations of 350 to 450 µg/kg. Other PAHs were detected only at boring location GB-27 at concentrations up to 130 µg/kg, estimated. 4,4'-DDT was detected at low concentrations (up to 12 µg/kg) at GB-27 and GB-35. PCBs were also detected at a concentration of 49 µg/kg, estimated, at GB-27. The pesticides aldrin, dieldrin, and alpha- and gamma-chlordane were detected at low concentrations (up to 4 µg/kg).

Analytical results from the waste samples in the eastern half of the site indicate that the waste material does not derive from a single source. Some of the material has very high calcium concentrations (12 to 20 percent by weight), suggesting that some of the material is waste gypsum. Other wastes contained high lead and/or mercury concentrations but low calcium concentrations (for example samples GB-27, 1 to 1.5 feet, and sample GB-49, 0.5 to 1 foot), suggesting that the materials may be ash rather than waste gypsum.

The analytical results also establish that the anomalous concentration of mercury detected in sample SB08 in the original PA (TtEMI 1999a) appears to be geographically isolated. Mercury was detected at a concentration of 113 mg/kg in sample AOC8, but samples from the four surrounding locations (GB29, GB30, GB33, BB34) contained much lower mercury concentrations (up to 0.19 mg/kg). Samples at four other boring locations contained mercury concentrations higher than 1 mg/kg, so the distribution of mercury appears to be erratic and primarily related to wastes rather than geographic location.

Analytical results for soils directly beneath and 2 feet beneath the waste materials were used to assess whether contaminants may have leached from the overlying wastes. Results are complicated to some extent by possible incorporation of waste material into underlying samples. The waste materials within the upper 1 foot of the surface were typically dry, powdery materials that would cascade downwards into the open borehole or along the annulus of the Geoprobe® sampler; therefore, soil samples from deeper depths were sometimes coated with waste material. Field samplers attempted to minimize potential for cross-contamination from shallower depths by preferentially excluding the waste-coated outer surface of the soil cores from the sample jars; however, it was not possible to separate the analytical samples from this fall-in waste material in most cases.

Contaminants appear to have leached from the wastes into underlying soils in a few locations. For example, at boring location GB-26, concentrations of cadmium, copper, lead, and mercury are higher in soils immediately beneath the waste (sample depth 2.25 to 2.75) than in the waste material itself (sample depth 1.5 to 2). Zinc concentrations in underlying soils exceeded concentrations in overlying wastes in borings GB-29, GB-45, GB-47, and GB-49. Lead concentrations in underlying soils exceeded concentrations in overlying wastes in boring GB-52. At other locations, contaminant concentrations in soils immediately below the waste are a significant fraction of concentrations in the waste itself. For example, lead and mercury concentrations in soils beneath the waste in boring GB-27 are one-third to one-half of the concentrations in the waste itself. Zinc concentrations in underlying soils were 68 to 95 percent as high as concentrations in overlying wastes in borings GB-39, GB-43, and GB-44. At many locations, contaminant concentrations in underlying soils are not appreciably different from concentrations in the waste material.

Soils 2 feet below the waste materials generally contained much lower concentrations of metals such as copper, lead, and zinc than shallower soils or waste materials, indicating that the affects of leaching primarily affect the uppermost soils immediately beneath the waste materials. In summary, the contaminant concentrations in waste materials were generally comparable to or of the same order of magnitude as concentrations in soils directly underlying the waste, suggesting that leaching from the waste materials to underlying soils has occurred or that the soils and wastes are both contaminated with the same contaminants. Soils 2 feet below the waste/soil interface typically had significantly lower concentrations of metals.

Conclusions: The following conclusions can be drawn about the eastern half of the site based on the additional sampling conducted for the preliminary assessment:

- Waste materials are present at most locations in the eastern half of the site. The waste materials are typically present only in the upper 1 foot of the subsurface, but wastes are present at deeper intervals in some locations.

- Waste materials composed of gypsum and ash appear to be present in the eastern half of the site. The waste materials are described as white crystalline materials or as very fine-grained powdery materials and contain varying concentrations of metals, including chromium, copper, lead, mercury, and zinc.

- Underlying soils appear to be affected by leaching from the waste materials, or are otherwise affected by the same contaminants. Soils directly beneath the wastes contained metals at concentrations comparable to those in the in the overlying waste materials. Soils 2 feet below the wastes typically contained much lower concentrations of contaminants, indicating that leaching or direct contamination primarily affects the soils directly beneath the wastes.

4.0 CHARACTERIZATION OF ADDITIONAL BARE SOIL AREAS

Three discrete potential waste material disposal areas in the northwest quarter of the site were not sampled during the original PA investigation. The three areas are suspected to be waste disposal areas because no plants grow in these areas. These three discrete waste areas were characterized by drilling a single borehole through the center of each bare soil area and collecting samples of the material, the soils that lie immediately beneath the material, and the soils that lie approximately 2 feet beneath the base of the material.

Field methods: One Geoprobe® boring was advanced through the center of each of the three bare soil areas (borings GB23, GB24, and GB25, Figure 4). Samples were collected from the waste materials, soils immediately underlying the wastes or surface soils, and soils 2 feet beneath the base of the waste or soils. Although wastes were not present at the location of boring GB-23, soil samples were collected because the boring is located in the center of a large patch of bare soils. Most of the samples were analyzed for a full suite of contaminants (metals, VOCs, SVOCs, pesticides, PCBs, and herbicides). The surface samples were not analyzed for VOCs because of the potential for volatilization and the waste sample from boring GB-24, which was inadvertently not analyzed for SVOCs or pesticides.

Results: Analytical results for the samples collected from three bare soil areas are presented in Table 2. The analytical results show that the waste materials in borings GB-24 and GB-25 contain high proportions of calcium (13 to 17 percent by weight), suggesting that these materials are waste gypsum and are contaminated with low concentrations of chromium and lead (up to 125 and 45 mg/kg, respectively). Underlying soils were contaminated with nickel, zinc, and, in GB-25, copper, suggesting that the underlying soils have been affected by leaching. Copper and zinc concentrations dropped by about an order of magnitude in soils 2 feet below the waste/soil interface at GB-25, indicating that leaching primarily affects soils directly beneath the waste material. In the bare soil area where wastes were not found, several polynuclear aromatic hydrocarbons (PAH) were detected at low concentrations (up to 230 μg/kg). Additionally, low concentrations of pesticides (up to 8 μg/kg) and PCBs (up to 58 μg/kg) were detected in the surface soil at GB-23 and in the waste material at GB-25. The waste material at GB-24 was inadvertently not analyzed for pesticides or PCBs.

Conclusions: Three bare soil areas in the west central part of the site were tested for contaminants. Waste materials in two of these areas appear to be waste gypsum that is contaminated with low concentrations of chromium, lead, pesticides, and PCBs. Soils that immediately underlie these two materials are contaminated with nickel, zinc, and in one case, copper. Waste was not detected in a third bare soil area. Samples from this area were contaminated with PAHs, pesticides, and PCBs at low concentrations.

5.0 CHARACTERIZATION OF SOUTHWEST CORNER OF SITE

Although no wastes were known to be present in the southwestern corner of the site, the area was investigated by advancing four boreholes (GB19 through GB22) to allay regulatory agency concerns. Boring locations are illustrated on Figure 4. Soil boring logs for these borings (included in Appendix A) show that waste materials such as those present at other parts of the site were not encountered. Additionally, the review of historical aerial photographs in the original PA report (TtEMI 1999a) does not show industrial activities or apparent storage or disposal of waste materials in these areas. Because only natural soils were encountered to a depth of 6 feet below grade in each boring and because no visual or olfactory evidence of contamination was noted, no samples were collected for laboratory analysis from these locations.

6.0 SCREENING-LEVEL HUMAN HEALTH RISK EVALUATION

Human health risks associated with AOC 1 were evaluated as a screening-level HHRA in the original PA report (TtEMI 1999a). The HHRA compared soil samples collected from nine locations in the original PA with EPA Region IX preliminary remediation goals (PRG) for industrial soils (EPA 2000a). PRGs are health-based concentrations in soil for individual chemicals that correspond to an excess lifetime cancer risk of 1×10^{-6} or a noncancer hazard quotient of 1. Cancer risks associated with exposure to multiple contaminants were assessed by summing risks for each contaminant. Noncancer health hazards associated with exposure to multiple contaminants were assessed by summing hazard quotients for each contaminant to derive a cumulative hazard index.

Based on the initial PRG screen, contaminants in the soil samples did not exceed Region IX PRGs and cumulative risks did not exceed EPA's acceptable risk range. Lead was not treated quantitatively in the same manner as other compounds because the PRG for lead is based on a blood lead model rather than a specific cancer risk or hazard index. However, the maximum concentration of lead detected at the site (11,400 mg/kg) significantly exceeded the updated industrial PRG for lead (750 mg/kg).

Supplemental PA sampling data collected in July 2000 were screened against updated EPA Region IX PRGs published in 2000 (EPA 2000a). The results of the screening level HHRA are presented in Table 4. For the industrial worker, the cancer risk associated with exposure to chemicals of potential concern (COPC) in soil (1.1×10^{-4}) slightly exceeds EPA's target risk range or the acceptable range of exposure defined by EPA. Virtually all of the risk is attributable to arsenic. It is possible that arsenic was used at the site to control pests or weeds. The total hazard index is 0.93, indicating no potential for adverse noncancer health effects at the site. The maximum concentration of lead detected in the supplemental PA sampling (973 mg/kg) exceeded the updated industrial PRG for lead (750 mg/kg). Arsenic and lead are the only compounds that exceeded the industrial PRGs.

The industrial PRGs were developed assuming that a typical worker would be exposed to site soils for 40 hours per week for 25 years. The site is currently restricted, and workers visit the site only occasionally for maintenance; Consequently, actual exposure to site contaminants would be much lower than assumed in development of the PRGs. In addition, waste materials at the site are typically covered by vegetation and/or 0.25 to 0.5 foot of topsoil, so direct contact with contaminated soils is limited. If debris and hot spots are removed as discussed in Section 8, the site would be acceptable for future industrial reuse based on the HHRA.

7.0 ECOLOGICAL RISK ASSESSMENT

Because of the potential threat to the environment posed by chemicals at AOC 1, ecological risk associated with the site was assessed in two ways. First, a screening-level ecological risk assessment (SLERA) was conducted following Navy policy (Navy 1999a) and EPA guidance for conducting SLERAs (EPA 1997, 1999a). The SLERA showed that the site may pose unacceptable risks to ecological receptors, as discussed in Section 7.1. Second, a more focused assessment of ecological risks at the site was conducted using more realistic assumptions of exposure. The following sections of this report discuss the SLERA and the more focused risk assessment separately.

7.1 SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT

The purpose of the SLERA is to identify potential exposure pathways and compare exposure point concentrations to established benchmarks. The SLERA was conducted following Navy policy (Navy 1999a), which is based on EPA's eight-step process for conducting SLERAs (EPA 1997, 1999a). The SLERA consists of two steps: (1) problem formulation and (2) exposure estimate and risk calculation. Step 1 evaluates whether there is significant habitat or whether the area is used by wildlife as well as whether there are actual or potentially complete exposure pathways. If exposure pathways to ecological receptors are potentially complete, soil concentrations at the site are compared to both ambient concentrations and toxicological benchmarks to assess ecological effects. Step 2 assesses exposure and calculates risk by estimating site-specific doses using conservative assumptions and comparing with established toxicity reference values (TRV). If the site passes the SLERA, it is considered to pose acceptable ecological risk, and no further work is required. If the site fails the SLERA because of the presence of complete exposure pathways and unacceptable risk, however, the site must either be further evaluated in a baseline ERA or undergo an interim cleanup action.

7.1.1 Problem Formulation (Step 1)

The following sections describe the problem formulation for AOC 1, including environmental setting and conceptual site model (CSM), which provides descriptions of known and potential stressors, evaluation of potential exposure pathways, discussion of chemical fate and transport, and identification of assessment and measurement endpoints. Problem formulation corresponds to Step 1 of the screening-level risk assessment process, as described in Navy policy for conducting ERAs (Navy 1999a). The site location and background are discussed in the PA report (TtEMI 1999a).

7.1.1.1 Environmental Setting

AOC 1 is currently undeveloped except for remnant concrete pavement from prior uses of the site and a fresh water pump station that was installed by CCCWD in 1998. The Navy purchased the property in 1982 to expand the aerial safety buffer for munitions handling at Pier 4, which is located approximately 1 mile northwest of AOC 1; future land use of the site will be open space. Nonnative upland grasses dominate the site, although the west-central portion of the site and parts of the fenceline contain mature stands of coyote brush (*Baccharis pilularis*). The most prominent species are ripgut grass (*Bromus diandras*), perennial rye grass (*Lolium perenne*), and yellow-star thistle (*Centaurea solstitialis*), interspersed with coyote brush.

Site-specific chemical concentration data from AOC 1 are limited to soil concentrations. Plant and animal tissue concentration data from remedial action subsite (RASS) 4 are available, however, and were used for this SLERA. The extensive sampling of RASS 4 in the 5-year post-remediation monitoring program at NWSSBD Concord has characterized chemical concentrations in soil and tissue for RASS 4 (PRC 1996a; 1997a, TtEMI 1998; 1999). Since the two sites are adjacent and have similar habitats, as described below, the RASS 4 tissue concentrations are thought to be comparable to concentrations expected at AOC 1.

RASS 4 contains extensive habitat that is comparable to AOC 1. RASS 4 is primarily an upland area with an emergent nontidal wetland in the eastern portion of the site. The site is mostly vegetated with nonnative grasses, although the southern portion of RASS 4 contains areas of pickleweed. Ripgut grass, yellow-star thistle, and coyote brush are the most prominent upland species in RASS 4. These nonnative grasses also dominate AOC 1; thus, upland plant tissue from RASS 4 is considered representative of species present at AOC 1. RASS 4 plant tissue concentrations associated with wetland plants are not used in this assessment.

Soils in RASS 4 and AOC 1 are contaminated with the same metals at comparable concentrations (Table 5). The chemicals of ecological concern in RASS 4 include arsenic, cadmium, copper, lead, mercury, selenium, and zinc. Since no tissue data exist for AOC 1, field-collected plant and rodent tissue data from RASS 4 for these metals were preferred over estimated concentrations derived from the literature.

Information regarding the use of the upland habitat at RASS 4 by bird species was acquired primarily through comprehensive bird surveys conducted during the winter and breeding season of 1995 and 1996 (PRC 1996a, Appendices B and C, respectively) and included point count surveys, nocturnal and crepuscular bird surveys, and raptor surveys. Raptors potentially present at AOC 1 include the Red-tailed Hawk (*Buteo jamaicensis*), American Kestrel (*Falco sparverius*), and Northern Harrier (*Circus cyaneus*), which were observed in RASS 4 during five raptor surveys from July 6 to August 1, 1995 (TtEMI 1997). Other birds observed at RASS 4 include the Red-winged Blackbird (*Agelarius phoeniceus*), Northern Mockingbird (*Mimus polyglottos*), Western Meadowlark (*Sturnella neglecta*), and Killdeer (*Charadrius vociferous*).

Mammal surveys and trapping were also conducted in 1994 (PRC 1996a, Appendix D). Because of the proximity of RASS 4 to AOC 1 and the presence of similar habitat at each site, it is reasonable to assume that mammal species feeding and foraging in RASS 4 could also be present at AOC 1. Based on results of small mammal surveys in RASS 4, the AOC 1 uplands probably support the California vole (*Microtus californicus*), house mouse (*Mus musculus*), and deer mouse (*Peromyscus maniculatus*). Other mammals observed in and around upland areas of RASS 4 include the California ground squirrel (*Spermophilus beecheyi*), black-tailed jackrabbit (*Lepus californicus*), striped skunk (*Mephitis mephitis*), and Virginia opossum (*Didelphis* *virginiana*) (Morrison and others 1994). Larger mammals potentially present in AOC 1 include the gray fox (*Urocyon cinereoargenteus)*, red fox (*Vulpes vulpes*), and coyote (*Canis latrans*).

Species with federal or state special conservation status, including endangered, threatened, and candidate species that may occur in the AOC 1 uplands are presented in Table 6. Because of the marginal scrubby habitat present at AOC 1, these avian species likely spend minimal time foraging and breeding in AOC 1. Some birds may, however, occasionally feed on rodents and other prey present at AOC 1; therefore, avian species are evaluated using food-chain modeling.

7.1.1.2 Conceptual Site Model

The CSM illustrates exposure pathways to be evaluated in the ERA and provides other key information such as chemical sources, release and transport mechanisms, and the relative importance of exposure pathways to specific receptor groups. The CSM includes the following components:

- Stressors
- Exposure pathways
- Fate and transport
- Assessment and measurement endpoints

The following sections briefly describe the components of the CSM at AOC 1, which is illustrated in Figure 5.

Stressors

Stressors can be defined as any factor that causes adverse ecological impacts at the site. The PA investigation revealed that the site contains several types of waste materials associated with the former fertilizer plant. These waste materials and associated contaminated soils are considered the stressors for this SLERA. The waste materials include (1) cinder roadbed material, (2) ash-like material, and (3) other wastes in bare soil areas. The cinder roadbed material is contaminated with lead and selenium at high concentrations (11,400 and 875 mg/kg, respectively). The ash-like material is contaminated with lead, mercury, and selenium at high concentrations (933, 113, and 68 mg/kg, respectively). The waste gypsum samples were not contaminated with high concentrations of metals. These potential chemical sources are described in more detail in Section 4.0.

Exposure Pathways

Potential exposure pathways at AOC 1 are diagrammed in the CSM (Figure 5). At AOC 1, soil is the predominant exposure pathway or the means by which a chemical travels from the source to a receptor. Surface water is not present at AOC 1; rainfall percolates into the soil without ponding. The nearest surface water bodies are Suisun Bay, 2,000 feet north of the site, and the RASS 4 wetlands, about 800 feet from the eastern boundary of the site. Groundwater was encountered 20 to 30 feet below grade at properties on both sides of AOC 1 (PRC 1994a, Harding-Lawson Associates 1977), which is too deep to affect ecological receptors. The Navy assumes that groundwater is present at a similar depth at AOC 1.

Exposure routes, or the point of entry of a chemical into a receptor, include root uptake and leaf sorption for plants; and inhalation, dermal contact, and ingestion of contaminated soil, surface water, and food for animals (Figure 6). Plants exposed to chemicals in soil may accumulate concentrations in their tissues that cause adverse effects to growth, reproduction, or survival. Independent of direct effects to the plant, chemicals in plant tissues may be transferred to herbivores, omnivores, and detritivores, which in turn may be consumed by omnivores and carnivores. Such food chain transfer, and associated bioaccumulation, may result in unacceptably high doses of chemicals to higher trophic level predators, even when concentrations in soil are safe for lower trophic level receptors. Risk to receptors at each trophic level is addressed separately to account for specificity in exposure parameters.

Ingestion of chemicals in soil and prey is considered to be the predominant exposure pathway for birds and mammals at AOC 1; exposure via inhalation and dermal contact are not considered in most SLERAs (EPA 1997). Terrestrial birds and mammals may ingest soil directly while feeding, grooming, and burrowing (Beyer and others 1994). Soil on or in the bodies of prey may also be consumed with the prey. For example, a bird feeding on an earthworm may ingest soil incidentally while probing for a worm. Soil adhering to the worm's body may be ingested as the bird captures and manipulates the worm. Finally, soil contained in the gut of the worm may be ingested when the bird eats the worm.

Fate and Transport

Potential influences on chemical migration are surface water runoff, groundwater transport, wind, and biotic transport. As discussed previously, surface water runoff and groundwater transport at AOC 1 are considered to be minimal. Wind transport of chemicals is expected to be minor because most of AOC 1 is covered with vegetation or remnant concrete slabs. The wind blows primarily from the west-northwest at the site; any wind-driven movement of airborne particles is expected to be to the east-southeast.

Chemicals may also be transported in plant and animal tissues (biotic transport). Chemicals in the bodies of mobile receptors such as fish, migrating birds, flying insects, and far-ranging predators may be carried off site and deposited in other locations in the form of feces or carcasses. Based on information gathered for the RASS 4 qualitative ecological assessment (TtEMI 1997), wide-ranging animals expected to visit the site include gray fox, Northern Harrier, and American Kestrel.

Metals detected at AOC 1 are for the most part associated with waste materials or in soils lying directly beneath them. The data presented in Sections 2.0 through 4.0 indicate that the waste materials are contaminated with metals and that these metals have leached to some extent into underlying soils. The deeper soil samples collected 2 feet below the waste/soil interface, however, typically contain low concentrations of metals. Therefore, metals that leach from the waste material appear to adsorb to clays in soils directly beneath the waste and become immobile. Metals do not chemically degrade; therefore, chemical transformation is not expected to reduce metals concentrations over time. Mercury and selenium are known to bioaccumulate, and transfer from soils to biota is expected.

Assessment and Measurement Endpoints

Assessment endpoints are "explicit expressions of the actual environmental values (e.g. ecological resources) that are to be protected" (EPA 1997). Assessment endpoints are environmental characteristics that, if significantly impaired, would indicate a need for action by risk managers. Measurement endpoints more closely reflect technical considerations in the risk assessment process; that is, measurement endpoints are focused on both direct measures of ecological effects such as toxicity tests and indirect effects such as food chain modeling that allow for an evaluation of risk to representative receptors. Measurement endpoints are often expressed as statistical or arithmetic summaries of observations and can include both measures of effect and measures of exposure.

Specific assessment and measurement endpoints for the upland habitat at AOC 1 are shown on Table 7. The rationale for their selection, relevant natural history, and the linkage between assessment and measurement endpoints are discussed in the following paragraphs. Assessment endpoints for the upland habitat of AOC 1 include the following:

- Protection of populations of upland plants
- Protection of populations of soil invertebrates
- Protection of population passerine birds
- Protection of populations of raptors
- Protection of populations of large carnivorous mammals

Plant and invertebrate populations were evaluated by comparing soil concentrations to published toxicity benchmarks and are described in Section 7.1.2.3. The vertebrate assessment endpoints were evaluated using food-chain modeling for representative receptors. The food chain model used soil chemistry, field-collected tissue data from RASS 4, and estimates of tissue concentrations derived from the literature. Food-chain modeling is discussed in Section 7.1.2.3.

Three vertebrate species representing separate feeding guilds were evaluated using food-chain analysis:

- Western Meadowlark (*Sturnella neglecta*): omnivorous passerine birds
- Northern Harrier *(Circus cyaneus)*: raptors
- Gray fox (*Urocyon cinereoargenteus*): large, carnivorous mammals

Passerine birds (represented by the Western Meadowlark) are omnivorous, consuming plants and invertebrates in upland habitats such as AOC 1. They are preyed upon by raptors and large mammals. Raptors (represented by the Northern Harrier) and large, carnivorous mammals (represented by the gray fox) are secondary or tertiary consumers; that is, theses species eat other carnivorous animals. Selected life history parameters relevant to the food chain modeling are presented below.

Western Meadowlark (*Sturnella neglecta*). The Western Meadowlark is a diurnal, robin-sized grassland bird and a common breeding resident in California. It inhabits grasslands, meadows, prairies, cultivated fields, pastures, and some shrubby habitats, and commonly makes use of transitional areas between emergent wetlands and uplands (Garrett and Dunn 1981; Peterson 1990; Small 1994).

The Western Meadowlark is found throughout California, except in higher mountains (Zeiner and others 1990a). Most populations in California are considered non-migratory, but there may be local post-breeding movement of resident birds and movement of nonresident birds into the state during winter (Zeiner and others 1990a). According to Lanyon (1956), as cited in Zeiner and others (1990a), the Western Meadowlark in Wisconsin had a territory of 3 to 15 acres. Four meadowlark territories in Iowa ranged from 10 to 32 acres (Kendeigh 1941, as cited in Zeiner and others 1990a).

The Western Meadowlark feeds in open, grassy areas, gleaning food from the ground or low plants and occasionally turning over objects and probing in soft earth (Stokes and Stokes 1996). Both avian and mammalian predators consume meadowlark eggs and young; adults are taken by raptors (Zeiner and others 1990a).

The meadowlark's annual diet is comprised of 63 percent animal matter (mostly insects, spiders, sowbugs, and snails) and 37 percent plant tissue (grass, forb seeds, and grains) (Zeiner and others 1990a). As with many omnivorous birds, animal matter makes up nearly 100 percent of the diet during the breeding season but is much less important at other times of the year (Martin and others 1961; Williams 1987). The food-chain modeling discussed in Section 7.1.2.3 assumed that the diet of the Western Meadowlark consisted of 63 percent invertebrate tissue and 37 percent plant tissue. For arsenic, cadmium, copper, lead, selenium, and zinc, the food-chain modeling used plant tissue residue data collected from RASS 4; for all other chemicals, tissue concentrations were estimated from bioaccumulation factors (BAF) for terrestrial plants (EPA 1999a). No field-collected invertebrate tissue concentrations were available; thus, invertebrate tissue concentrations were estimated from BAFs for soil invertebrates (Sample and others 1996; EPA 1999a)

Northern Harrier (*Circus cyaneus*). The Northern Harrier is a low-flying raptor of meadows, grasslands, open rangelands, desert sinks, and freshwater and saline emergent wetlands of North America and Eurasia. It can be locally abundant in relatively undisturbed areas dominated by thick vegetation growth (MacWhirter and Bildstein 1996). Harriers forage in open habitats such as prairies, shrub-steppe uplands, and marshes. According to Brown and Amadon (1968), harriers nest on the ground in shrubby vegetation, usually at the edge of a marsh in an undisturbed area. They have also been found to nest in emergent wetlands, along rivers or lakes, in grasslands, grain fields, or sagebrush flats away from water. The size of a Northern Harrier's home range in the breeding season is 420 to 3,707 acres, with the median home range from eight studies being 642 acres (MacWhirter and Bildstein 1996).

The Northern Harrier is a permanent resident of the northeastern plateau and coastal areas of California, breeding from sea level to 1,700 meters in the Central Valley and Sierra Nevada, as well as up to 800 meters in northeastern California (Zeiner and others 1990a). It is designated a California species of special concern (Harvey and others 1992). Harriers have been observed nesting and foraging in the tidal marshes of NWSSBD Concord.

According to Temeles (1989), harriers near Davis, California, attacked rodents almost exclusively (93 percent of 531 capture attempts). Brown and Amadon (1968) state that their diet consists of many small mammals as well as many birds, frogs, small reptiles, crustaceans, and insects. MacWhirter and Bildstein (1996) report that the harrier preys on small and medium-sized rodents and birds (chiefly passerines and small water birds), reptiles, and frogs in the summer and Microtus (voles) almost exclusively in the winter. Both adult and young harriers also ingest plant material. As cited by Palmer (1988), Breckenridge (1935) found fleshy fruits of dogwood, blueberries, and raspberries in pellets of young harriers.

For the food-chain modeling described in Section 7.1.2.3, the diet of the Northern Harrier was assumed to be 100 percent rodent. For arsenic, cadmium, copper, lead, mercury, selenium, and zinc, the sum of kidney and liver concentrations in rodents collected in RASS 4 were used as prey concentrations for the harrier. Tissue concentrations for all other chemicals were derived from BAFs for the herbivorous deer mouse (EPA 1999a).

Gray Fox (*Urocyon cinereoargenteus*). The gray fox occurs at low to middle elevations in many habitats throughout most of the U.S. and California (Burt and Grossenheider 1976; Zeiner and others 1990b). Trapp and Hallberg (1975) describe its preferred habitat as shrub lands and brushy woodland, on hilly, rough, rocky, or broken terrain. Zeiner and others (1990b) report that habitats in California include shrub lands, valley foothill riparian, montane riparian, and brush stages of many types of woodland. Throughout its range, the gray fox may be found in association with cultivated areas (Zeiner and others 1990b). A year-round resident, the gray fox is primarily nocturnal or crepuscular, but is occasionally active during the day (Ingles 1965). Gray foxes live in dens. Although they prefer to inhabit dens in natural cavities, rock piles, snags, logs, slash piles, hollow trees, and under buildings, they will sometimes dig or enlarge an existing burrow (Zeiner and others 1990b).

According to Trapp and Hallberg (1975), as cited in Zeiner and others (1990b), the home ranges of gray foxes in areas of Wisconsin and Florida varied from 32 to 1,900 acres. Fuller (1978), as cited in Zeiner and others (1990b), found that the female average home range was 320 acres in areas near Davis, California.

Feeding patterns vary considerably with season and locale. The gray fox is generally omnivorous and opportunistic with a diet that may include mammals, insects, fruits, birds, carrion, plants, grains, and nuts (Trapp and Hallberg 1975; Zeiner and others 1990b). For the food-chain modeling described in Section 7.1.2.3, the diet of the gray fox was assumed to be 100 percent rodent. For arsenic, cadmium, copper, lead, mercury, selenium, and zinc, the sum of kidney, liver, and bone concentrations in rodents collected in RASS 4 were used as prey concentrations for the gray fox. Tissue concentrations for all other chemicals were derived from BAFs for the herbivorous deer mouse (EPA 1999a).

7.1.2 Exposure Estimate and Risk Calculation (Step 2)

The following sections describe the exposure estimate and risk calculation for AOC 1, corresponding to Step 2 of the screening-level risk assessment process, as described in Navy policy for ERAs (Navy 1999a).

7.1.2.1 Characterization of Exposure

Concentrations of inorganic and organic chemicals in soil samples collected from 0 to 2 feet bgs at AOC 1 are presented in Table 8.

Identification of Chemicals of Potential Ecological Concern

Chemicals of potential ecological concern (COPEC) were identified by comparing concentrations of chemicals detected in soils from AOC 1 with ambient concentrations previously defined for the soils in the Inland Area (Los Medanos Hills samples) at NWSSBD Concord (PRC 1996b). An ERA that is focused on chemicals that exceed local ambient concentrations provides the support necessary to develop defensible remedial action objectives, as required by Navy policy (Navy 1999b). Based on 61 soil samples (0 to 2 feet bgs) from AOC 1, chemicals at AOC 1 were considered COPECs if the maximum concentration detected at the site exceeded the Concord Inland Area ambient concentration. Chemicals for which ambient concentrations are not available, including all organic chemicals, were automatically retained as COPECs and evaluated in the ERA.

Results of the COPEC screening are presented in Table 9. Other statistical parameters such as average, median, and 95 percent upper confidence limit (UCL_{95}) are presented in the table to show the distribution of the population of detected concentrations. The one-sided UCL_{95} of the arithmetic mean concentration is considered a conservative upper bound estimate of the mean soil concentration. For compounds with a detection frequency of less than 40 percent, the bootstrapping procedure (Singh and others 1997) was used to calculate a UCL_{95} value. For compounds that were detected in fewer than three samples, the maximum detected concentration is reported as a UCL_{95} concentration. The UCL_{95} concentration is used in the more focused assessment described in Section 7.2.

Seventeen of the 19 metals for which ambient concentrations were available were considered COPECs based on ambient screening; only beryllium and nickel were eliminated. All detected organic compounds, including SVOCs, pesticides, and PCBs, were considered COPECs since ambient concentrations have not been established for these compounds.

7.1.2.2 Statistical Identification of Hot Spots

A box plot analysis was used to interpret the distribution of COPECs at AOC 1. Box plots are diagrams that illustrate the statistical parameters of a data set and to identify statistical outliers. The "box" is defined by the 25th and 75th percentiles of the data and includes the median. The length of the box is called the "h-spread" and is equivalent to the interquartile range. The "whiskers" of the box plot extend from the box and show the range of concentrations that fall within 1.5 h-spreads of the top and bottom of the box. Concentrations that were greater than the length of the whisker were identified as statistical outliers or "hot spots."

Box plots for all COPECs except for those chemicals detected too infrequently to define a statistical distribution (fewer than 6 samples) are included in Appendix C. Review of these box plots shows that most frequently detected compounds had statistical outliers and that the statistical outliers were frequently collocated. For example, locations SB03, SB05, GB27, and GB52 are considered hot spots for both lead and selenium. Mercury and selenium outlier concentrations were also frequently collocated (for example, at SB01, SB08, and GB27). Locations SB05 and GB28 are considered hot spots for five or more metals. All metals had at least one statistical outlier.

The box plot analysis shows that AOC 1 contains numerous hot spots for different metals. Any remedial actions at AOC 1 should be focused on hot spots for metals that are determined to pose an ecological risk. Proposed remedial actions are discussed in Section 9.0.

7.1.2.3 Characterization of Ecological Effects

Ecological effects of exposure to COPECs at AOC 1 were characterized by comparing estimated tissue concentrations with established toxicological benchmarks (for plants and invertebrates) and by food-chain modeling (for birds and mammals).

Plants

To evaluate potential ecological effects to plants, chemical concentrations measured in soil samples from AOC 1 were compared with Oak Ridge National Laboratory (ORNL) benchmarks for plants (Efroymson and others 1997a) (Table 10). Soil concentrations for comparison were represented by the minimum and maximum concentrations detected at the site and the UCL_{95} (a conservative upper bound estimate of the mean soil concentration). Concord Inland Area ambient values are also presented for comparison in Table 10.

The ORNL plant toxicity benchmarks are concentrations of chemicals that correspond to the lowest observed effects concentration (LOEC) for the 10^{th} percentile of plant species tested (Suter and others 1993; Will and Suter 1994a; Will and Suter 1995a; Efroymson and others 1997a). Plant toxicity benchmarks are lower than most preliminary remediation goals (Lockheed Martin Energy Systems 1997). While not completely appropriate for the habitat at AOC 1, the ORNL plant toxicity benchmarks are the best available general benchmarks for terrestrial plants.

Maximum concentrations of aluminum, arsenic, cadmium, chromium, cobalt, copper, lead, manganese, mercury, molybdenum, selenium, silver, vanadium, and zinc exceeded ORNL plant benchmarks (Table 10). The UCL_{95} soil concentrations of aluminum, chromium, cobalt, copper, manganese, molybdenum, selenium, silver, and vanadium, however, were comparable to the ambient values developed for Concord inland soils and are not considered further. Based on screening chemical concentrations in soil at AOC 1 against established toxicological benchmarks and ambient concentrations, concentrations of arsenic, cadmium, lead, mercury, and zinc in soils at AOC 1 may pose a risk to plants.

Invertebrates

To evaluate potential ecological effects to invertebrates, chemical concentrations measured in soil samples from AOC 1 were compared with ORNL benchmarks for soil and litter invertebrates (Efroymson and others 1997b) (Table 11). Chemical concentrations in soil samples from AOC 1 were compared with LOECs for statistically significant effects on growth, reproduction, or activity to evaluate potential ecological effects to terrestrial invertebrates. Soil concentrations for comparison were represented by the minimum and maximum concentrations detected at the site and the UCL_{95} (a conservative upper bound estimate of the mean soil concentration). Concord Inland Area ambient values are also presented for comparison in Table 11.

Maximum concentrations of arsenic, cadmium, chromium, copper, lead, and zinc exceeded benchmark values; however, UCL_{95} concentrations for chromium and copper were comparable to the ambient values developed for Concord Inland Area soils (Table 11). Based on screening chemical concentrations in soil at AOC 1 against established toxicological benchmarks and ambient concentrations, concentrations of arsenic, cadmium, lead, and zinc in soils at AOC 1 may pose a risk to invertebrates.

Vertebrates

Food-chain models were used to assess exposure of the Western Meadowlark, Northern Harrier, and gray fox to COPECs at AOC 1. Food-chain models were used to estimate doses to these receptors, which were then compared with TRVs derived by the Navy and the Biological Technical Advisory Group (BTAG) to assess risk (EFA West 1998). The assumptions, parameters, and a detailed discussion of the methods used in the food-chain model are presented in Appendix D. In general, all doses calculated in the SLERA were based on a typical receptor, incorporating parameters such as average adult body weight, average ingestion rate, and estimated SUF from the literature.

Soil concentrations are available for AOC 1; however, prey tissues were not collected or analysed as a part of this PA. As discussed in Section 7.1.1.1, RASS 4 shares similar habitat and soil metals concentrations with AOC 1; therefore, tissue concentrations from RASS 4 are believed to be comparable to those in AOC 1. Wherever possible, metals concentrations in plant and rodent tissues collected from RASS 4 were used in the food-chain models. For arsenic, cadmium, copper, lead, selenium, and zinc, the RASS 4 plant and rodent tissue concentrations published in the baseline conditions report (PRC 1994b) were used in the food-chain modelling to estimate doses to modelled receptors. For mercury, concentrations in rodent tissue from RASS 4 from the year 4 monitoring report (TtEMI 1999b) were used in food-chain modelling for AOC 1. Mercury concentrations in RASS 4 plants are not available. For mercury concentrations in plants and all other metals and organic compounds, literature BAFs were multiplied by the site-specific soil concentrations measured at AOC 1 to estimate the tissue concentrations used in the food chain models.

Tissue concentrations for all other chemicals were derived using EPA-recommended BAFs presented in the literature (Sample and others 1996; EPA 1998; EPA 1999a) (Table 12). BAFs are defined as the ratio of the concentration of a chemical in a tissue sample to the concentration of the chemical in soil. Chemical concentrations in prey were converted from wet weight to dry weight when necessary, as described in Appendix D, to be consistent with the soil concentrations, ingestion rates, and TRVs.

Estimated daily doses, or the total quantity of chemicals ingested in soil and prey, were calculated for each vertebrate receptor and are presented in Tables 13 through 15. These estimated doses were divided by TRVs to derive a hazard quotient (HQ). EPA risk assessment guidance (EPA 1989) indicates that receptors may be at risk if the HQ exceeds 1.0. HQs were calculated for all COPECs for which the Navy has derived TRVs (Engineering Field Activity West [EFA WEST] 1998). COPECs for which TRVs are not available were evaluated qualitatively in Section 7.1.2.4 by comparing estimated doses to no effect and low effect levels reported in the literature.

Two types of TRVs are available: high TRVs and low TRVs. High TRVs represent doses that caused observable effects in laboratory animals. An HQ greater than 1.0 based on a high TRV indicates unacceptable risk. Low TRVs represent a dose at which no adverse effects were observed in laboratory animals, or a chronic no-effect level. An HQ of less than 1.0 based on a low TRV indicates little to no risk. An HQ above 1.0 based on a low TRV indicates potential risk.

In the following sections, the food-chain modelling results for each receptor are summarized and discussed.

Western Meadowlark

Results of the screening level food chain modeling for the Western Meadowlark are presented in Table 13. All HQs greater than 1.0 are summarized in the table below. Table 13 shows that HQs based on a high TRV for arsenic, cadmium, lead, mercury, selenium, and zinc exceed 1.0; therefore, these metals pose an unacceptable risk to the Western Meadowlark based on the conservative assumptions used in the SLERA. Estimated HQs for cadmium and selenium exceeded 100, based on high TRVs and the conservative exposure assumptions used in the SLERA. Additionally, estimated HQs based on low TRVs for all of the chemicals listed above plus copper, manganese, total DDTs, and total PCBs exceeded 1.0, indicating potential risk to the Western Meadowlark from these chemicals, based on the conservative exposure assumptions used in the SLERA.

HAZARD QUOTIENTS FOR THE WESTERN MEADOWLARK

COPEC	HQ based on High TRV	HQ based on Low TRV
Arsenic	1.8	7.2
Cadmium	582.4	930.9
Copper	0.3	7.4
Lead	443.8	17,439
Manganese	0.3	3.4
Mercury	31.0	142.9
Selenium	261.0	1,055
Zinc	4.0	39.8
Total DDTs	No TRV	22.1
Total PCBs	0.2	2.8

Northern Harrier

Results of the screening level food-chain modeling for the Northern Harrier are presented in Table 14. All HQs greater than 1.0 are summarized in the table below. Table 14 shows that HQs based on a high TRV for lead and selenium exceed 1.0; therefore, these metals pose an unacceptable risk to the Northern Harrier under the conservative assumptions used in the SLERA. Additionally, estimated HQs based on low TRVs for cadmium, copper, lead, mercury, selenium, and zinc exceeded 1.0, indicating potential risk to the Northern Harrier from these chemicals, based on the conservative exposure assumptions used in the SLERA.

HAZARD QUOTIENTS FOR THE NORTHERN HARRIER

COPEC	HQ based on High TRV	HQ based on Low TRV
Cadmium	0.1	16.1
Copper	0.3	6.5
Lead	1.2	480
Mercury	0.5	2.1
Selenium	6.3	25.6
Zinc	0.6	5.6

Gray Fox

Results of the screening level food chain modeling for the gray fox are presented in Table 15. All HQs greater than 1.0 are summarized in the table below. Table 15 shows that the HQ based on a high TRV for selenium exceeds 1.0; therefore, selenium poses an unacceptable risk to the Northern Harrier under the conservative assumptions used in the SLERA. Additionally, estimated HQs based on low TRVs for arsenic, cadmium, copper, lead, mercury, selenium, and zinc exceeded 1.0, indicating potential risk to the gray fox from these chemicals, based on the conservative exposure assumptions used in the SLERA.

HAZARD QUOTIENTS FOR THE GRAY FOX

COPEC	HQ based on High TRV	HQ based on Low TRV
Arsenic	0.1	1.6
Cadmium	0.7	28.5
Copper	0.03	6.3
Lead	0.2	20,271
Mercury	0.6	5.9
Selenium	7.7	164.5
Zinc	0.6	29.7

7.1.2.4 Qualitative Evaluation of Chemical of Potential Ecological Concern Toxicity Reference Values

When no TRV was available for a given chemical-receptor pair, a dose was calculated and qualitatively compared with literature-reported doses. Allometrically converted doses were calculated for the receptors of interest based on the toxicity studies identified in the literature. The primary literature source was Agency of Toxic Substances and Disease Registry (ATSDR) profiles of each chemical. Best professional judgment was used in interpreting the literature data when information on a chemical was limited. Uncertainty associated with this approach is discussed in Section 7.3.

Qualitative Evaluation of Risk to Birds

Sufficient data are available to qualitatively evaluate the effects of modeled doses of chromium, molybdenum, silver, thallium, and high molecular weight (HMW) PAHs to the Western Meadowlark and Northern Harrier. Doses were calculated for aluminum, antimony, barium, cobalt, vanadium, low molecular weight (LMW) PAHs, aldrin, dieldrin, and total chlordanes, and phenol, but insufficient toxicological information is available to evaluate these chemicals. Table 16 summarizes the maximum food-chain modeled doses, the measured effects of metal toxicity studies conducted using avian species, and the associated allometrically converted doses.

Based on a comparison of doses from the literature with maximum doses modeled for both the Western Meadowlark and the Northern Harrier, concentrations of chromium, silver, and thallium in AOC 1 are not likely to pose a risk to avian receptors. Estimated maximum site doses of molybdenum and high molecular weight PAHs for the Western Meadowlark exceeded one of two literature doses; the other dose cited is above the AOC 1 site-specific dose. For the high molecular weight PAHs, the maximum food-chain modeled dose exceeded the no-effects levels; however, the site doses were well below the literature effects levels.

Qualitative Evaluation of Risk to Mammals

Sufficient data are available to qualitatively evaluate the effects of modeled doses of aluminum, antimony, barium, chromium, molybdenum, silver, vanadium, and total chlordanes to the gray fox. A dose was calculated for dieldrin, thallium, and phenol, but insufficient toxicological information is available for these chemicals. Table 17 summarizes the maximum food-chain modeled doses, the measured effects of metal toxicity studies conducted using mammalian species, and the associated allometrically converted doses.

Comparing doses from the literature with doses modeled for the gray fox indicates that the maximum concentrations of aluminum, antimony, barium, chromium, molybdenum, silver, vanadium, and total chlordanes in AOC 1 are not likely to pose a risk to mammalian receptors.

Chemicals of Potential Ecological Concern Not Modeled

Individual PAHs (including benzo[a]anthracene; benzo[a]pyrene (BaP); benzo[b]fluoranthene; benzo[k]fluoranthene; chrysene; fluoranthene; phenanthrene; and pyrene) were detected at the site and identified as COPECs. For the purpose of this evaluation, PAHs were grouped and summed together as HMW PAHs and LMW PAHs. Of the PAHs detected at the site, only phenanthrene is a LMW PAH. The remaining PAHs were grouped together as HMW PAHs.

For birds, TRVs are not available for any PAH. The HMW PAH group was thus qualitatively compared to doses in the literature, as described in the previous section. LMW PAHs were not evaluated.

For mammals, TRVs are available only for BaP and naphthalene. To derive an HQ for the gray fox, estimated doses for these groups of PAHs were divided by TRVs that are representative of each group. The TRV for BaP was assumed to be representative of all HMW PAHs, and the TRV for naphthalene was assumed to be representative of all LMW PAHs. HQs for HMW and LMW PAHs indicate little to no risk to mammals from both LMW and HMW PAHs.

HQs were not calculated for alpha-chlordane, gamma-chlordane, Aroclor-1248, Aroclor-1254, dieldrin, or phenol because no TRVs exist for these chemicals and no toxicological information is available to evaluate effects of doses of these compounds. Some of these compounds were, however, grouped together and evaluated using TRVs for both birds and mammals. For example, alpha-chlordane and gamma-chlordane were evaluated together as total chlordanes; Aroclor-1248 and Arochlor-1254 were evaluated together as total PCBs. Little information is available regarding dieldrin and phenol.

7.1.2.5 Summary of Risk Characterization (Step 2)

The risk characterization summaries for plants, invertebrates, and vertebrates are presented in the following sections.

Risk to Plants

The UCL_{95} soil concentrations of aluminum, arsenic, cadmium, chromium, lead, mercury, and zinc exceeded both ORNL toxicity benchmarks for plants and ambient values developed for Concord Inland Area soils (Efroymson and others 1997a) (Table 10); however, the UCL_{95} soil concentrations of aluminum and chromium were comparable to the ambient values for these metals, and they are not considered further. As previously discussed, the ORNL plant toxicity benchmarks are not completely appropriate for the upland habitat at AOC 1, but they are the best available general benchmarks for plants. In addition, screening bulk soil concentrations against ORNL benchmarks may overestimate the potential risk to plants posed by these chemicals since it is unlikely that the metals will be 100 percent bioavailable for uptake by plants. Soils at AOC 1 may pose a risk to plants; however, because nonnative grasses dominate upland habitat at AOC 1, cleanup goals will be based primarily on vertebrate receptors rather than plants. The remedial action discussed in Section 8.0, however, is expected to address risks to plants by removing soils with the highest concentrations of lead, mercury, and selenium.

Risk to Invertebrates

UCL_{95} soil concentrations of arsenic, cadmium, chromium, and zinc exceeded both ORNL toxicity benchmarks for soil and litter invertebrates and ambient values for Concord inland soils (Table 11). However, the UCL_{95} concentration of chromium was comparable to the ambient concentration, and chromium is not considered further. As previously discussed, the ORNL earthworm toxicity benchmarks are not completely appropriate for the upland habitat at AOC 1, but they are the best available general benchmarks for invertebrates. In addition, screening bulk soil concentrations against ORNL benchmarks may overestimate the potential risk to plants posed by these chemicals since it is unlikely that the metals will be 100 percent bioavailable for uptake by earthworms. Based on screening chemical concentrations in soil at AOC 1 against established toxicological benchmarks, soils at AOC 1 may pose a risk to invertebrates. The remedial action discussed in Section 8.0, which will be based primarily on risks vertebrate receptors, will also result in risk reduction to terrestrial invertebrates.

Risk to Vertebrates

Risks to representative receptors (the Western meadowlark, Northern Harrier, and gray fox) were evaluated through food chain modeling using conservative assumptions recommended by EPA (EPA 1999a). Results of the food-chain modeling are presented in Tables 13 through 15. Food-chain modeling for the Western Meadowlark derived HQs based on high TRVs that exceed 1.0 for arsenic, cadmium, lead, mercury, selenium, and zinc, indicating that these metals pose an unacceptable risk to the Western Meadowlark under the conservative assumptions used in the SLERA. Food-chain modeling using the same set of assumptions showed that soil concentrations of lead and selenium pose unacceptable risks to the Northern Harrier and soil concentrations of selenium pose an unacceptable risk to the gray fox. Modeled HQs based on low TRVs exceeded

1.0 for arsenic, cadmium, copper, lead, manganese, mercury, selenium, zinc, total DDTs, and total PCBs, indicating potential risk to one or more of the modeled receptors from these chemicals under the conservative exposure assumptions used in the SLERA.

7.2 FOCUSED ASSESSMENT

The SLERA showed that the concentrations of certain metals in soil at AOC 1 soils pose unacceptable risk to the Western Meadowlark, Northern Harrier, and gray fox using very conservative assumptions. In accordance with EPA recommendations for SLERAs (EPA 1999a), the modeling assumed that the soil concentration was the maximum concentration detected in AOC 1 and that chemicals were 100 percent bioavailable to the receptors. The modelling also assumed that the site use factor (SUF) was 1.0, indicating that AOC 1 comprises 100 percent of the foraging and feeding area for the receptor. However, these assumptions are unrealistically conservative in many cases. For example, the maximum soil concentration detected at the site was assumed to be 100 percent bioavailable and representative of all soil concentrations throughout the range of a receptor. For lead, the SLERA assumed that 11,400 mg/kg was representative of soil concentrations throughout the site and that lead was 100 percent bioavailable. In actuality, however, the UCL_{95} for lead is almost 2 orders of magnitude lower (186.6 mg/kg), and lead is probably about 10 percent bioavailable in these types of soils (Landrum and others 1994).

Because the SLERA determined that the site poses an unacceptable risk, the Navy conducted a more focused assessment to evaluate ecological risks using more realistic assumptions. The more focused assessment was conducted instead of a baseline risk assessment because several chemicals were associated with very high HQs (up to 263 when using the high TRV), which indicate an immediate and significant risk. The Navy feels that a time-critical removal action will address these risks more quickly and efficiently than further ecological analysis.

The more focused assessment refined risk estimates only for the vertebrate receptors. Food-chain modeling was conducted for the more focused assessment using more realistic, site- and receptor-specific assumptions about the site to more realistically assess actual risks at AOC 1. Only chemicals with HQs greater than 1.0 in the SLERA were modeled using these more realistic assumptions. The following sections of this report describe the more focused ERA.

7.2.1 Site-specific and Receptor-specific Assumptions

More realistic, site-specific and receptor-specific assumptions that were used in the food chain modeling for the focused assessment included more representative (1) soil concentrations, (2) prey concentrations, and (3) foraging range for receptors of interest.

Representative Soil Concentrations

The focused assessment used UCL_{95} soil concentrations to model risk to receptors. The UCL_{95} concentration is considered a conservative upper bound estimate of the mean soil concentration. For compounds with a detection frequency of less than 40 percent, the bootstrapping procedure (Singh and others 1997) was used to calculate a UCL_{95} value. For compounds detected in fewer than three samples, the maximum detected concentration was used instead of the UCL_{95}. As noted previously, the UCL_{95} concentration is more than an order of magnitude lower than the maximum soil concentration for some metals, including lead, mercury, and selenium, reflecting the heterogeneous distribution of these metals at AOC 1.

The uptake of metals by plants and animals from soils, sediments, water, and prey is a complex, dynamic process. A chemical must be available to an organism (bioavailable) before it can be accumulated or cause an adverse effect. Only the bioavailable fraction can cause physiological or toxicological responses (Hamelink and others 1994). The bioavailability of chemicals in soil is dependent on numerous factors, including pH, organic matter content, soil moisture, soil texture, cation exchange capacity, electrical conductivity, and the concentrations of various inorganic and organic ligands and elements present in the soil. Because reliable factors to adjust AOC 1 soils for bioavailability are not available, the UCL_{95} concentration was not adjusted for bioavailability; thus, risk associated with soil ingestion may be overestimated.

Representative Prey Concentrations

Where actual tissue concentrations from RASS 4 were available, UCL_{95} tissue concentrations from RASS 4 were used in the focused assessment. These included plant tissue and rodent tissue concentrations for arsenic, cadmium, copper, lead, selenium, and zinc, and rodent tissue concentrations for mercury. For all other chemicals, the EPA-recommended BAF (EPA 1999a) was multiplied by the UCL_{95} soil concentration to calculate an estimated UCL_{95} tissue concentration.

Prey tissue concentrations are not completely bioavailable to consumers. Chemicals that have accumulated in plant or prey tissue are not completely absorbed by receptors that consume the tissue. Among many receptor-specific factors influencing absorption are species, metabolic status, age, and route of exposure. Prey tissue concentrations were adjusted for bioavailability for the focused assessment by multiplying estimated $UCL_{.95}$ tissue concentrations by absorption coefficients recommended by Owen (1990) and presented in Table 18; these coefficients are based primarily on rodent studies.

Foraging Range

A third overly conservative assumption used in the food chain modeling for the SLERA was the SUF. EPA guidance (1999a) suggests using an SUF of 1.0 for SLERA calculations, indicating that a receptor derives 100 percent of its sustenance from the site. In reality, however, several of the modeled receptors have foraging ranges that exceed the area of the site. For the focused assessment, SUFs were derived by dividing the area of the site (17.2 acres) by reported foraging ranges in California or minimum reported foraging ranges. For the Western Meadowlark, an SUF of 1.0 was used, because foraging ranges from 3 to 32 acres were reported (Lanyon 1956 and Kendeigh 1941, as cited in Zeiner and others 1990a). For the Northern Harrier, an SUF of 0.57 was used because foraging ranges for the Northern Harrier of 30 to 3,707 acres were reported (Craighead and Craighead 1956, as cited in Zeiner and others 1990a; MacWhirter and Bildstein 1996). For the gray fox, an SUF of 0.05 was used because Fuller (1978, as cited in Zeiner and others 1990b), found that average home range for the female gray fox was 320 acres in areas near Davis, California.

7.2.2 Focused Assessment Food-Chain Modeling Results

Food-chain models that were used to assess risk for the focused assessment used more realistic, site- and receptor-specific assumptions. Results of the focused assessment food-chain models are presented in Tables 19 through 21. HQs presented in these tables are based on high TRVs only; HQs based on low TRVs were not assessed.

Risk estimates decreased substantially when using more realistic assumptions about the site. Chemicals present at the site did not pose unacceptable risks to the Northern Harrier or gray fox under the assumptions of the focused food-chain modeling. Mercury and selenium, however, still posed unacceptable risks to the Meadowlark using the more realistic assumptions. HQs that were calculated using the high TRV for the Western Meadowlark using the more realistic, site- and receptor-specific assumptions exceeded 1.0 for mercury (1.9) and selenium (3.7). HQs calculated for the focused assessment indicate that the waste materials at AOC 1 that are contaminated with these metals pose an unacceptable risk.

7.3 UNCERTAINTY ANALYSIS

Uncertainty plays an important role in risk-based decision-making and is therefore incorporated explicitly into the risk characterization. Identifying known sources of uncertainty using conservative default assumptions allows potential error to be more explicit in the risk management process (Suter 1993). Suter (1993) describes the following three sources of uncertainty in ERAs:

- Mistakes in execution of assessment activities (errors such as incorrect measurements, data recording errors, and computational errors)
- Imperfect knowledge of factors that could be known (lack of knowledge about some aspect of the ecosystem that may be relevant, such as assumptions used in dose models; practical constraints on the ability to measure everything; and lack of knowledge on the toxicological effects of all chemicals on all species)
- Inherent randomness of the world (stochasticity in physical or biological processes that may affect assumptions or actual risk, such as variation in population parameters or rainfall pattern)

The complexity of ecological systems tends to increase the level of uncertainty involved in ERAs, as compared with HHRAs. Using realistic assumptions is the best approach to reducing the uncertainty associated with conclusions in an ERA. The following sections briefly review some sources of uncertainty identified for AOC 1.

7.3.1 Tissue Residue Concentrations

The only available data specific to AOC 1 are soil chemical concentrations. Tissues from various plants and three rodent species were collected from RASS 4 and analyzed for arsenic, cadmium, copper, lead, mercury (rodent tissue only), selenium, and zinc. For all other chemicals, tissue concentrations were estimated using EPA-recommended BAFs (1999a), multiplied by the site-specific soil concentrations.

The field-collected tissue samples provide an empirical measure of the transfer of chemicals from the physical matrix to biological tissue. Collection of AOC 1-specific tissue samples, however, instead of those collected at RASS 4, would help to reduce the degree of uncertainty in exposure and biological fate of COPECs at AOC 1. In addition, field-collected tissues analysed for the full suite of compounds, rather than just six or seven metals, would provide a more likely indication of true tissue residue concentrations in food items present at AOC 1.

For a limited number of metals, measured tissue concentrations from RASS 4 were used in the food-chain modelling. Tissue concentrations for all other metals and all organic chemicals were estimated by using literature-derived BAFs. Because literature-derived BAFs are often overly conservative, the tissue concentrations used in the food-chain modeling are expected to overestimate chemical concentrations in tissue in most cases.

7.3.2 Estimated Doses

Assumptions used in estimating ingested doses are identified in Appendix D. These assumptions and model parameters are based mostly on scientific literature and may not accurately represent species or conditions at the site. Sources of uncertainty in dose estimates include inaccuracy in model parameters based on poor literature data, population and individual variation in life history, and variation in dietary patterns of animals at the site. In addition, the lack of empirical data for each receptor necessitated using simple scaling equations to estimate receptor-specific ingestion rates; these estimates may not accurately represent actual ingestion rates and are a source of uncertainty in the dose calculation. An additional source of uncertainty is introduced in the estimation of food ingestion rates. Allometric regression models were used to estimate food consumption based on metabolic rate derived by Nagy and others (1999) for various groups of birds and mammals. Food ingestion rates estimated using these allometric equations are expressed as kilograms of dry weight per day. Wildlife do not generally consume dry food (unless maintained in the laboratory); therefore, some investigators suggest converting food consumption rates to kilograms of fresh weight by adding the water content of the food (Suter and others 2000). Because both RASS 4 tissue residue results from the analytical laboratories and recommended literature BAFs (Sample and others 1996; EPA 1998, 1999a) were reported in wet weight, it was necessary to convert the tissue results to dry weight for mathematical consistency in the allometric equations used to estimate doses. Since plant/soil BAFs were provided in dry weight, this conversion was not performed for the plant/soil values provided in Table 12. Further reasoning behind the conversion from wet to dry weight is that the TRVs, which were used to calculate HQs and compare estimated doses to determine whether risk exists to higher-level receptors, are also reported on the basis of dry weight. This conversion from wet to dry weight may overestimate chemical concentrations in tissue, potentially resulting in higher calculated risk.

The use of dose models as estimates of exposure assumes that exposure to the animal through other routes (such as dermal exposure or drinking of surface water) is minimal. In general, it is common practice in ERAs to focus on ingestion of contaminated prey and soil (Pascoe and others 1996, EPA 1997), although ignoring other sources may lead to underestimation of risk.

7.3.3 Toxicity Reference Values

Uncertainty associated with the derivation and use of TRVs is described in "Development of Toxicity Reference Values as Part of a Regional Approach for Conducting Ecological Risk Assessments at Naval Facilities in California" (EFA WEST 1998). Allometric conversion was incorporated into the derivation of TRVs for site-specific receptors; extrapolation between taxa is a source of uncertainty. For example, the underlying assumption that a given effect on a small bird is the same as on a larger bird per unit body weight may not be true.

For some chemicals, uncertainty is associated with the TRV. For example, for both mammalian and avian receptors, the low TRV for lead was not based on a no-effects level dose, but rather the lowest-known-effects-level dose that was then increased by 10 percent to account for uncertainty. A similar uncertainty factor was applied to copper, manganese, and zinc.

7.3.4 Hazard Quotients

The HQ approach used in comparing site chemicals with screening values and comparing ingested doses with TRVs is commonly employed in ERAs (EPA 1992b; Tiebout and Brugger 1995). An HQ greater than 1.0 is generally considered to indicate a potential for risk; however, the HQ cannot be used to gauge either the probability or the magnitude of effects. The HQ approach has been criticized (Tiebout and Brugger 1995), and caution should be exercised in the interpretation of HQs.

7.3.5 Bioavailability Analysis

Absorption coefficients described and summarized in a review by Owen (1990) were used to adjust for bioavailability of arsenic, cadmium, copper, lead, selenium, and zinc. Owen's review provides route-specific absorption coefficients that are based on data reported in three databases, many agency documents, and nearly 200 articles from 30 scientific journals. The absorption coefficients represent the percentage of a chemical that is absorbed by the organism that consumes food contaminated with that chemical. The absorption coefficients are primarily derived from toxicity studies involving chemical doses administered to laboratory animals, and take into account many situation-specific factors including species, metabolic status, age, and route of exposure to the animals. Thus, absorption coefficients represent a relatively comprehensive range of values. In this risk assessment, the average absorption coefficient reported by Owen (1990) was used to estimate the bioavailability of chemicals in food items. Absorption coefficients reported by Owen (1990) are based primarily on rodent studies; using these absorption coefficients to estimate bioavailability to birds is a source of uncertainty.

7.4 CONCLUSIONS OF RISK ASSESSMENT AND RISK MANAGEMENT RECOMMENDATIONS

Potential risk to ecological receptors at AOC 1 was evaluated in the ERA because the Navy has concluded based on the two-phase PA that a release has occurred at the property and the site is a potential threat to the environment. In addition, the site meets the following two criteria listed in the national contingency plan (NCP) (Title 40 of the *Code of Federal Regulations* [40 CFR] 300.415 [b][2]), and is therefore a candidate for a removal action:

- Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants
- High levels of hazardous substances or pollutants or chemicals in soils largely at or near the surface

Complete exposure pathways exist for ecological receptors exposed to soils in AOC 1. Concentrations of several chemicals in soils exceed ambient concentrations for Concord Inland Area soils. Lead, mercury, and selenium concentrations were frequently identified as statistical outliers, indicating the presence of hot spots for these metals, and were often observed at high concentrations at the same sampling location. In addition, UCL_{95} concentrations of some metals exceeded toxicity benchmarks for plants and terrestrial invertebrates. Food-chain modeling indicated that neither the Northern Harrier nor gray fox are at immediate or significant risk from any chemicals at the site based on realistic exposure assumptions. However, the results of the focused assessment for AOC 1 indicate that mercury and selenium at the site pose unacceptable risk to the Western Meadowlark. A removal action is recommended to reduce ecological risk posed by these metals at AOC 1.

8.0 CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER ACTION

Human health risks associated with contaminants present at AOC 1 were assessed using a screening level approach by comparing contaminant concentrations with EPA Region IX PRGs for industrial soils. Maximum lead concentrations at the site exceeded industrial PRGs. Cancer risks associated with exposure to multiple contaminants were assessed by summing risks for each contaminant. Cumulative cancer risks for industrial workers (1.1×10^{-4}) slightly exceeded EPA's target risk range. Virtually all of the cancer risk was attributable to arsenic. Actual human health risk at the site is mitigated by the fact that site access is restricted and workers visit the site only for occasional maintenance and by the fact that waste materials at the site are typically covered by vegetation and/or several inches of topsoil.

To assess ecological risks associated with waste materials at AOC 1, a SLERA was performed using food-chain modeling and conservative assumptions recommended by EPA (EPA 1999a), as discussed in Section 7.1. The SLERA indicated risk to plants and invertebrates because soil concentrations exceeded both ambient concentrations and ORNL benchmarks. The SLERA used food-chain modeling to assess risk to representative bird and mammal receptors. Food-chain modeling using conservative assumptions indicated unacceptable risk; HQs exceeded 1.0 for arsenic, cadmium, lead, mercury, selenium, and zinc. To refine the risk assessment for vertebrates at AOC 1, a more focused ecological risk assessment was performed based on more realistic assumptions about the site, as described in Section 7.2. The focused ecological risk assessment indicated that mercury and selenium in waste materials at AOC 1 pose unacceptable risks to the Western Meadowlark. Accordingly, the Navy intends to perform a time-critical removal action to excavate and properly dispose of waste materials that contain high concentrations of mercury and selenium in order to reduce ecological risks at AOC 1.

Based on the PA investigation, the Navy has concluded that a release has occurred at the property and the site is a threat to the environment because it meets the following two criteria listed in the NCP:

- Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants, and
- High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface

The rationale for performing a time-critical removal action is to protect receptors exposed to immediate and significant ecological risks as rapidly and expeditiously as possible. A time-critical removal action will reduce ecological risks significantly more rapidly than a non-time critical removal action.

Mercury and selenium are strongly associated with cinder roadbed material and with two hot spots in the waste materials in the northeast and north-central parts of AOC 1. Three of the eight highest detected concentrations of mercury and four of the eight highest detected concentrations of selenium are associated with the cinder roadbed material. Three of the remaining highest detected concentrations of mercury and selenium are associated with two hot spots at GB27 and SB08. Excavation and disposal of the cinder roadbed material and these two hot spots are recommended to remove the highest concentrations of mercury and selenium and to reduce ecological risks posed by these two metals. The proposed removal action will remove all 3 of the statistical outliers for mercury and 7 of the 11 statistical outliers for selenium. The waste materials associated with the remaining 3 statistical outliers for selenium that will not be addressed by the proposed removal action have selenium concentrations more than an order of magnitude lower than the highest concentrations detected at the site. A corollary benefit of removing the cinder material and the two hot spots is that elevated concentrations of lead will also be removed, because elevated concentrations of lead, mercury, and selenium are collocated.

Locations of the proposed excavation areas are illustrated in Figure 11. The proposed excavation areas around the two hot spots shown in Figure 11 were conservatively drawn to encompass almost all of the untested soils between the sampling locations where elevated concentrations of mercury and selenium were detected and the nearest locations where concentrations of these metals have been shown to be significantly lower. Soils within the proposed excavation areas should be excavated to a depth of 2 feet below ground surface and replaced with clean fill.

Existing analytical data for soils directly beneath the cinder material, the hot spot at GB27, and waste materials in other parts of the site indicates that leaching of metals into underlying soils is limited and is not vertically extensive. Nevertheless, the excavation areas should be backfilled with clean fill to restore the original grading at the site and to minimize any potential residual risks associated with soils left in place in these areas.

During the removal action, confirmation samples will be collected at the perimeter and base of each excavation to confirm that the most contaminated soils have been removed. Confirmation sampling results will be merged with existing data to calculate post-removal UCL_{95} soil concentrations that are representative of the site. Food-chain modeling will then be performed using the techniques described in Section 7.2 to verify that HQs based on high TRVs have been reduced to less than 1.0 and that immediate and significant ecological risks are no longer posed by the site. Preliminary evaluation of existing analytical data indicates that the proposed time-critical removal action will substantially reduce ecological risks posed by the site and will reduce HQs for all chemicals at the site to less than 1.0.

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APPENDIX A

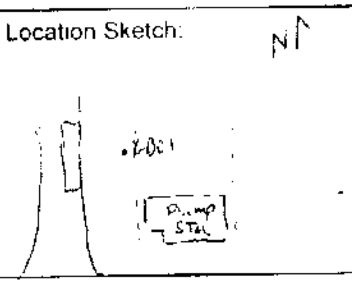
SOIL BORING LOGS

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

Boring Number: GB01	Date Started/Completed: 7/18/00 / 7/18/00
Drilling Method: GEOPROBE	Location Sketch:
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date): N/A	
Driller: G THOMPSON (FAST TEK)	
Logged By: C. GORMAN	



Soil Boring GB01

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–4	N/A	DRIVE 0-4' REC. 4'	N/A	SILT, dark brown, dry, stiff, trace gravel, minor clay friable (breaks along thin, horizontal laminae of sandy silt) Clay content increases with depth to ~10% @ 2.5' Trace organics (dry rootlets). color changes to light yellowish brown (gradually) becomes CLAYEY SILT @ ~3.8'	ML	N/A	0.0
4–6	N/A	Drive 4-6' REC. 2'	N/A	gravel content increases to ~10% in small (3") lens @ 5.25' Sand content increases to 10% becomes moist @ 5.5'	~~[illegible]~~		0.0
6				TD = 6'			
7							
8							
9							
10							

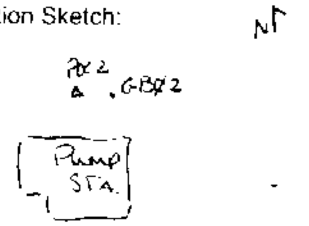
Sheet 1 of __

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: POC #1
Project: NWS Concord

Boring Number: GB02	Date Started/Completed: 7/18/00
Drilling Method: GEOPROBE	Location Sketch:
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date) N/A	
Driller: G. THOMPSON (FAST TEK)	
Logged By: C. GURMAN	

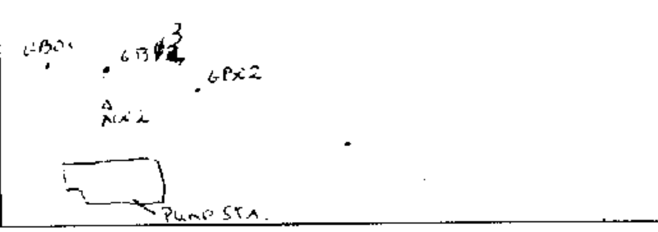


Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Soil Boring GB02 Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–4	N/A	Drive 0-4' Rec. 4'	N/A	~~2" organics + topsoil~~ to reddish-purple 2"-6" BGS (RC) GRAVELLY SILT, pale gray, dry, loose, 30% gravel (up to 0.2"), 10% sand. Gravel is irridescent + has vitreous lustre = CINDER ROADBED material. @6" - CLAYEY SILT, light brown, dry, hard, stiff, sli friable (fine laminae). ~20% clay, trace gravel. Clay content increases with depth, to 30% @ 4'	ML	N/A	0.0
4–6	N/A	Drive 4-6' Rec. 2'	N/A	Silt content increases. @ 5', clay content decreases to 20% (~75% silt), trace gravel.			0.0
6				TD = 6'			

TETRA TECH EM INC. **SOIL BORING AND WELL INSTALLATION LOG**

CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

Boring Number: GB03	Date Started/Completed: 7/18/00
Drilling Method: GEOPROBE	Location Sketch:
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft bgs., date) N/A	
Driller: G THOMPSON (FAST TEK)	
Logged By: C GORMAN	



Soil Boring GB03

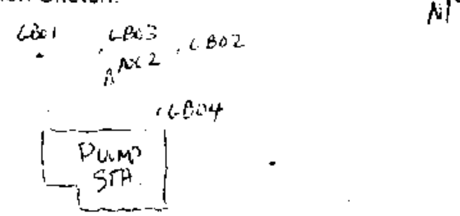
Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–4	N/A	Drive 0-4 Rec. 4'	N/A	3" SILT WITH ROOTS, + GRASS, GRAVEL, (SURFACE + SOIL @ SURFACE) 2" THICK LAYER OF BRICK RED GRAVEL (CINDER MATERIAL) @ 3'. CLAYEY SILT, med. brown, dry, med. stiff, trace gravel.	ML	N/A	0.0
4–6	N/A	Drive 4-6 Rec. 2'	N/A	(AS ABOVE) Gravelly sandy lens @ 5.5'			0.0
6				TD=6'			

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: AOC #1
Project: CONCORD NWS

Boring Number: 6B04	Date Started/Completed: 7/18/20 / 7/15/20
Drilling Method: GEOPROBE	Location Sketch:
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date) N/A	
Driller: G THOMPSON (FAST TEK)	
Logged By: C GORMAN	



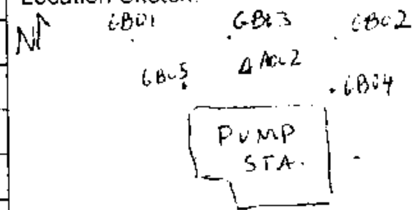
Soil Boring 6B04

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–4	N/A	Drive 0-4 Rec 4'	N/A	6" TOPSOIL + SANDY GRAVEL SILT, light brown, dry, loose, ~10% gravel, 10% sand. REDDISH PURPLE CINDER @ 2' (~2" THICK), GRAVEL + SANDY MATERIAL. CLAYEY SILT, dark brown, dry, stiff, 20% clay, trace gravel, trace caliche along fractures mod. friable. Occasional fine laminae.	~~ML~~ ML	N/A	0.0
4–6	N/A	Drive 4-6' Rec 2'	N/A	Clay content increases with depth. Color changes (gradually) to yellowish brown @ 4'			0.0
				TD = 6'			

TETRA TECH EM INC. **SOIL BORING AND WELL INSTALLATION LOG**

CTO: 267
Bldg./Site: AOC #1
Project: Concord LUCS

Boring Number: 6BØ5	Date Started/Completed: 7/18/00
Drilling Method: GEOPROBE	Location Sketch:
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft bgs., date) N/A	
Driller: G. THOMPSON (FASTER)	
Logged By: C. GORMAN	



Soil Boring 6BØ5

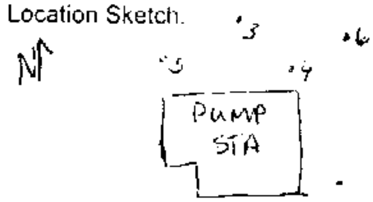
Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–4	N/A	Drive 0-4' Rec 4'	N/A	2" GRAVELLY SILT + TOPSOIL CLAYEY SILT, med brown to yellowish brown, dry, stiff, sli friable. Occasional laminae (sandy silt), trace gravel. Trace caliche along fractures no cinder material.	ML	N/A	0.0
4–6	N/A	Drive 4-6' Rec 2'	N/A	Clay content increases with depth to ~30% @ 4.5' becomes sli moist @ 5'			0.0
6				TD=6'			
7							
8							
9							
10							

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: ADC #1
Project: NWS CONCORD

Boring Number:	GB06	Date Started/Completed:	7/18/00 / 7/18/00
Drilling Method:	GEOPROBE	Location Sketch:	
Outer Diameter of Boring:	2"		
Inner Diameter of Well Casing:	N/A		
Depth to Water (ft. bgs., date)	N/A		
Driller:	G. THOMPSON (FAST TEK)		
Logged By:	C. GORMAN		



Soil Boring GB06

Lithologic Description

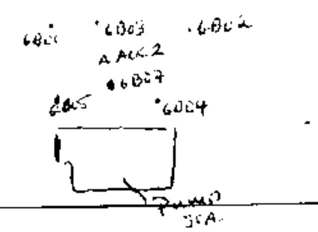
Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–4	N/A	Drive 0-4' Rec. 3.5'	N/A	SILT w/ GRAVEL + TOPSOIL (3") @6" CINDER ROADBED MATERIAL (~2" THICK), DARK BLACK IRRIDESCENT (VITREOUS) CLAYEY SILT, ~~light yellowish~~ Med. brown, dry, med. stiff, trace gravel, trace caliche along fractures. ~25% clay. Trace organic material (rootlets). clay content increases to ~30% @ 3'. becomes SiL, moist color changes to light yellowish brown @ ~4' (gradual change)	ML	N/A	0.0
4–6	N/A	Drive 4-6' Rec.	N/A	becomes dry and v. stiff @ 5'. Friable			0.0
				TD=6'			

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

Boring Number: 6B07	Date Started/Completed: 7/18/00 / 7/18/00
Drilling Method: GEOPROBE	Location Sketch:
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date) N/A	
Driller: G. THOMPSON	
Logged By: C. GERMAN	



Soil Boring 6B07

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–4	N/A	Drive 0-4 Rec. 4'	N/A	2" TOPSOIL + GRAVEL / SILT SILT, brown, dry, friable, ~15% Clay, trace organic material. (No cinder material) Clay content increases to ~25% @ 2' Trace caliche along fractures. Color changes (gradually) to light yellowish brown @ 3.5'. Becomes v. stiff, Clay content increases to ~40%. Slight plasticity, slightly moist	ML	N/A	0.0
4–6	N/A	Drive 4-6' Rec. 2'	N/A	(AS ABOVE) Clay content decreases @ 5.5' (gradual) to ~20%. Silt content increases to 70%. (5% gravel, 5% sand) increase in friability, becomes dry.			0.0
				TD = 6'			

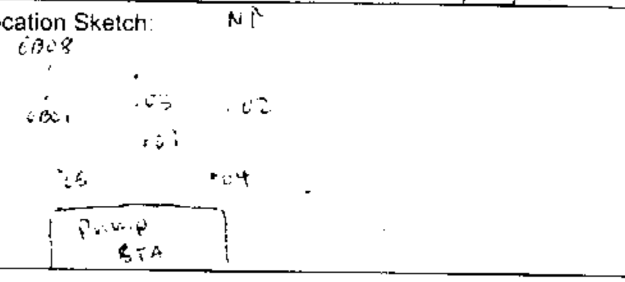
Depth scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 2647
Bldg./Site: AOC #1
Project: NWS CONCORD

Boring Number: 6B08	Date Started/Completed: 7/18/02 / 7/18/02
Drilling Method: GEOPROBE	Location Sketch:
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date): N/A	
Driller: G. THOMPSON (FAST TEK)	
Logged By: C. GORMAN	



Soil Boring 6B08

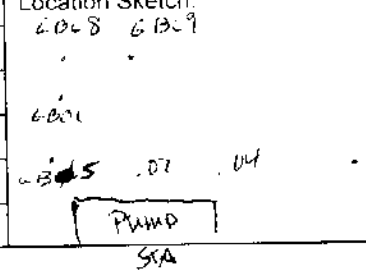
Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–4	N/A	Drive 0-4' Rec 3.8'		(INITIAL BORING - REFUSAL @ 3' - RELOCATE 6" AWAY) 3" TOPSOIL + GRAVEL/SILT. SILT, brown, dry, sl. friable, ~~20%~~ ~15% clay, trace sand, trace gravel. (NO CINDER) Becomes v. stiff @ ~2'. Color changes (gradually) to light yellowish brown. Clay content ↑ to ~30%. Several large gravel clasts (up to 3") @ 3' (granitic composition), extremely stiff ~~silty~~ clayey silt.	ML	N/A	0.0
4–6	N/A	Drive 4-6' Rec.		Color changes to yellowish orange @ 4' (v. fine sand) Sand content increases, clay content decreases (~10% sand, 15% clay, 75% silt). Becomes loose + friable. (occasional laminae). [SANDY SILT]			0.0
6				TD = 6'			

CTO: 207
Bldg./Site: AOC #1
Project: NWS CONCORD

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

Boring Number: 6B09	Date Started/Completed: 7/18/00 / 7/18/00
Drilling Method: GEOPROBE	Location Sketch:
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date)	
Driller: G. THOMPSON	
Logged By: C. GERMAN	



Soil Boring 6B09

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–4	NA	Drive 0-4 Rec 3.5'	N/A	TOPSOIL (1") SILT, med brown, dry, med stiff ~10% sand, trace gravel, ~15% clay. Becomes v. stiff @ 2'. 3" THICK LAYER OF V.V. FINE LIGHT GRAY SAND @ 3.5' (ASH MATERIAL)? SLIGHTLY DARKER. LARGE ROCK IN SLEEVE @ 4' - Pos powdering of sample just above it. Rock = "gabbro/granitic texture, black + white visible pyroxene)	ML	N/A	0.0
4–6	NA	Drive 4-6 Rec 2'	N/A	Becomes Sandy @ 4'. Color changes to light yellowish brown (SANDY SILT) ~25% v. fine sand, 5-10% clay, 60% silt, trace gravel. material is dry, med. loose,			0.0

TD=6'

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

Boring Number: 6B10	Date Started/Completed: 7/18/00 / 7/18/00
Drilling Method: GEOPROBE	Location Sketch: ~N
Outer Diameter of Boring: 2"	6B08 6B09 6B10
Inner Diameter of Well Casing: N/A	6B01 6B03 6B02
Depth to Water (ft bgs., date)	6B05 6B07 6B04
Driller: G. THOMPSON	PUMP STA.
Logged By: C. EDRMAN	

Soil Boring 6B014

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–4	NA	Drive 0-4' Rec. 4'	NA	TOPSOIL + SILT/GRAVEL @ SURFACE SILT, brown, dry, stiff, sli friable, ~20% clay, trace gravel, trace sand. 2-6" lens of poss ASH MATERIAL – light gray, powdery @ 1.5' .5% gravel @ 3.0' (clasts up to 2" dark grayish green quartzite?)	ML	N/A	0.0
4–6	NA	Drive 4-6' Rec. 2'	NA	Becomes SANDY SILT @ ~4'. light yellowish brown, dry, med. loose, 40% sand, 60% silt. (v. fine sand			0.0
6				TD = 6'			

Depth scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

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CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

TETRA TECH EM INC. **SOIL BORING AND WELL INSTALLATION LOG**

Boring Number: GB 11	Date Started/Completed: 7/18/00 / 7/18/00
Drilling Method: GEOPROBE	Location Sketch: N/A
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date) N/A	
Driller: C. THOMPSON (FAST TEK)	
Logged By: C. GORMAN	

Soil Boring GB 11

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
				Step N from GB010 to det. extent of ash material.			
0–4	N/A	Drive 0-4' Rec 0-4'	N/A	TOPSOIL + GRASS (0.5") SILT, brown, dry, med. stiff, slightly friable ~10% v. fine sand, ~10% clay. 2"-6" (poorly defined contact) of light gray ash @ 1.0'	ML	N/A	0.0
				becomes SANDY SILT @ ~3.5', light yellowish brown, dry, med. loose, ~80% sand, ~70% silt, ~5% clay			0.0
4–6	N/A	Drive 4-6' Rec 4-6'	N/A				
6				TD = 6'			

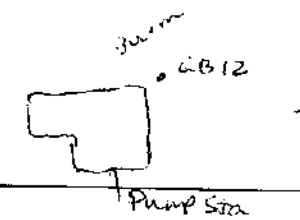
Sheet 1 of 1

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

Boring Number: GB 12	Date Started/Completed: 7/18/00
Drilling Method: GEOPROBE	Location Sketch.
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date) N/A	
Driller. G. THOMPSON (FAST TEK)	
Logged By: C. GORMAN	



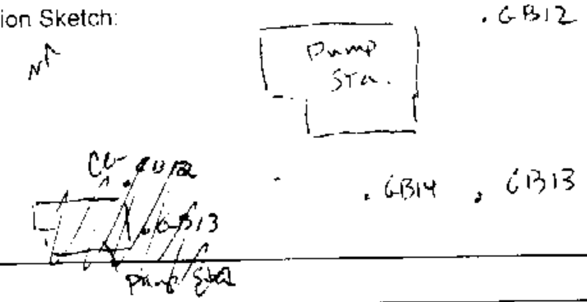
Soil Boring GB 12

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–4	N/A	Drive 0-4' Rec. 0-4'	N/A	GRAVEL + SILT / TOPSOIL @ Surface (3") SILT, brown (mottled with gray + yellowish brown), dry, med loose, ~15% gravel (1/4" to 1", rounded) decrease in gravel content (to trace) @ 1.5' organic layer @ 2' (Strong H_2S odor) = roots + decayed grass, twigs). ≅ 2" Thick. (0.0 ppm on PID). Clay content increases with depth to ~30%. @ 3.5', becomes slightly moist and v. stiff, med. plasticity.	ML	N/A	0.0
4–6	N/A	Drive 4-6' Rec 4-6'					0.0
6				TD = 6'			
7							
8							
9							
10							

CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

TETRA TECH EM INC. SOIL BORING AND WELL INSTALLATION LOG

Boring Number: 6B 13	Date Started/Completed: 7/18/00
Drilling Method: GEOPROBE	Location Sketch:
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date) N/A	
Driller: C. THOMPSON (FAST TEK)	
Logged By: C. GORMAN	



Soil Boring 6B 13

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–1	N/A	0-4' Rec. 4'	N/A	TOPSOIL, GRAVEL + SILT (6") SILT, brown, dry, sli stiff, ~20% clay, trace gravel, trace sand.	ML	N/A	0.0
2				3"-6" Layer of REDDISH-PURPLE CINDER MATERIAL @ 2'			
3				Clay content increases to ~30% @ 3', becomes v. stiff, sli moist, trace organic material (rootlets). [CLAYEY SILT]			
4–6	N/A	4-6' Rec. 2'					0.0
6				TD = 6'			
7							
8							
9							
10							

Sheet 1 of 1

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

Boring Number: GB 14	Date Started/Completed: 7/15/10
Drilling Method: GEOPROBE	Location Sketch:
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date): N/A	
Driller: G THOMPSON (FAST TEK)	
Logged By: C GORMAN	

Location Sketch: GB12, PUMP STA, ~~GB13~~, GB14, GB13

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Soil Boring GB 14 Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–4	N/A	Drive 0-4 Rec 4'	N/A	3" GRAVEL (ROAD MATERIAL) SILT, dark brown, dry to sl. moist, med stiff, ~20% clay, trace gravel, trace sand. 3" THICK layer of black to purplish-black CINDER MATERIAL Fresh surfaces = black, vitreous to metallic lustre. Weathered surfaces = maroon to purplish-black, dull lustre - 2.5 - 2.75 ft	ML	N/A	0.0
4–8	N/A	Drive 4-8 Rec 4'	N/A	Color changes to light yellowish-brown ~ 5' (gradual), becomes sl. moist. 2" Thick gravelly lens @ ~ 6'			0.0
8–10				TD = 8'			

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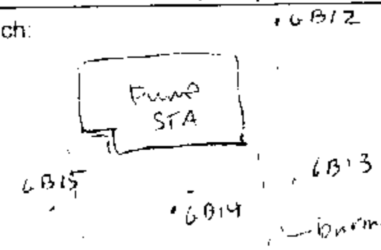
TETRA TECH EM INC. **SOIL BORING AND WELL INSTALLATION LOG**

CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

Boring Number: GB 15	Date Started/Completed: 7/18/00
Drilling Method: GEOPROBE	Location Sketch:
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date) N/A	
Driller: G. THOMPSON (FAST TEK)	
Logged By: C. GORMAN	



Soil Boring GB15

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–4	N/A	Drive 0-4' Rec 4'	N/A	3" GRAVEL (Surface) SILT, dark brown, dry, med. stiff, ~20% clay, trace gravel, trace sand.	ML	N/A	0.0
3				becomes moist @ 3' Clay content increases to ~30%, sl. plasticity.			
4–8	N/A	Drive 4-8' Rec 4'	N/A	Color changes to light yellowish brown (gradually) sand content increases to ~20% (v fine sand), clay content decreases (~15% clay, ~65% silt).			0.0
8				TD = 8'			
9							
10							

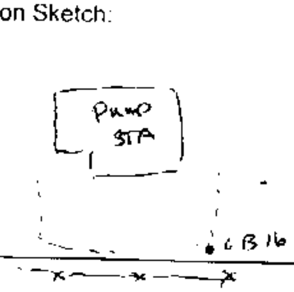
TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

Boring Number	GB 16
Drilling Method:	GEOPROBE
Outer Diameter of Boring:	2"
Inner Diameter of Well Casing:	N/A
Depth to Water (ft bgs., date)	N/A
Driller:	C. THOMPSON (FAST TEK)
Logged By:	C. GORMAN
Date Started/Completed:	7/18/00 / 7/18/00

Location Sketch:



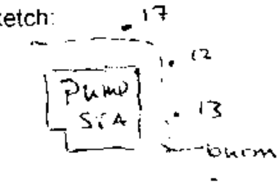
Soil Boring GB 16

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–4	N/A	Drive 0-4 Rec 4'	N/A	GRAVEL + TOPSOIL SURFACE SILT, brown, dry, ~15% clay, trace gravel (up to 0.5") med stiff, slightly plastic. 0.5" Thick (trace) layer of BLACK CINDER MATERIAL @ 1.5' Clay content increases w/ depth to ~30% @ 3'	ML	N/A	0.0
4–6	N/A	Drive 4-6 Rec 2'	N/A	becomes sl. moist @ 4.25' Color changes (gradually) to light brownish yellow @ 5'			0.0
6–10				TD: 6'			

CTO: 267
Bldg./Site: AOC #1
Project: NWS (CONCORD)

TETRA TECH EM INC. SOIL BORING AND WELL INSTALLATION LOG

Boring Number: GB 17	Date Started/Completed: 7/18/00 / 7/18/00
Drilling Method: GEOPROBE	Location Sketch:
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date): N/A	
Driller: G. THOMPSON (FAST TEK)	
Logged By: C. GORMAN	



Soil Boring GB17

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–1	N/A	Drive 0-4 Rec 4'	N/A	GRAVEL + TOPSOIL @ Surface (3") SILT, brown, dry, med loose, trace gravel (up to 0.5") ~20% clay.	ML	N/A	0.0
2				becomes stiff @ 2', trace calcite, organic material (rootlets).			
3				Color changes (gradually) to light yellowish brown @ 4'.			
4	N/A	Drive 4-6 Rec 2'	N/A	Sand content increases to ~10% @ 5'.			0.0
5							
6				TD=6'			
7							
8							
9							
10							

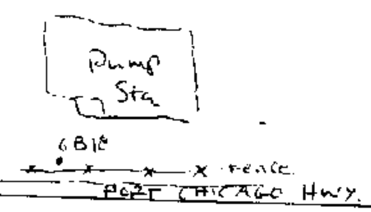
Sheet 1 of 1

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: AOI #1
Project: NWS CONCORD

Boring Number: GB18	Date Started/Completed: 7/18/00 / 7/18/00
Drilling Method: GEOPROBE	Location Sketch: NA
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs, date) N/A	
Driller: G. THOMPSON (FAST TEK)	
Logged By: C GORMAN	



Soil Boring GB18

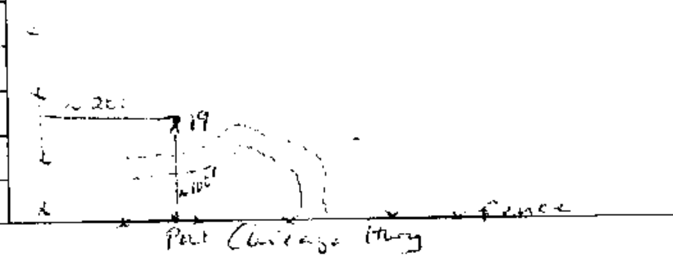
Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–4	N/A	Drive 0-4' Rec 4'	N/A	SILT + GRAVEL/ TOPSOIL (6")			
				SILT, brown, dry, med-loose, trace organic material, trace sand, ~ 10% gravel, ~ 15% clay becomes med. stiff @ 1.5'	ML	N/A	0.0
				Concrete @ 2'			
				@ 2' a ¼" layer of v. fine asphalt gravel is present. Not as vesicular + glassy as CINDER material, but may be finer grained version of same. Probably just asphalt.			
				Clay content increases @ 3' to ~ 25%			
4–6	N/A	Drive 4-6' Rec. 2'		Slightly plastic.			0.0
				Color gradually changes to light yellowish brown @ 5'. Sand content increases to ~ 20%, becomes slightly moist.			
6				TD=6'			

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: AOC #1
Project: NWS Concord

Boring Number: GB 19	Date Started/Completed:
Drilling Method: Geoprobe	Location Sketch: N
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date) N/A	
Driller: C. Svadiba (Fast Tek)	
Logged By: C. Gorman	



Soil Boring GB 19

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–4	N/A	Drive 0-4 Rec 4'	N/A	Topsoil, gravel, & silt (6") SILT, brown, dry, stiff to v. stiff, ~30% clay, 5-10% gravel, (rounded up to 1.5"), trace sand, trace calcite/caliche. Sand content increases to ~10% @ 2'. Becomes SANDY SILT @ 3' ~35% v. fine sand, poorly graded, light yellowish brown, dry, v. tight (compacted), 5-10% clay, 65% silt, trace organic material (rootlets)	ML	N/A	0.0 (0'); 0.0 (2')
4–6	N/A	Drive 4-6' Rec 2	N/A	Grainsize increases to fine sand @ ~5' (gradual). ~~becomes medium~~			0.0
6				TD = 6'			

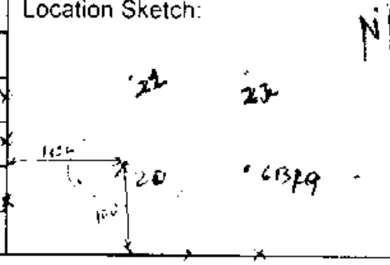
TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

Boring Number: GB20	Date Started/Completed: 7/19/02
Drilling Method: GEOPROBE	Location Sketch:
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date): N/A	
Driller: E. SVADUBA (FAST TEK)	
Logged By: C. ERMAN	

Location Sketch:



Soil Boring GB20

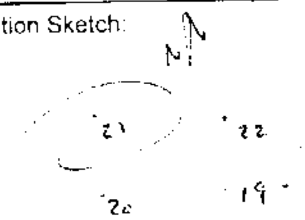
Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–1	N/A	Drive 0-4' Rec. 3.3'	N/A	TOPSOIL, GRAVEL+SILT (6") SILT, brown, dry, stiff, ~20% clay, 5-10% sand, trace gravel, trace calcite.	ML	N/A	0.0
2				becomes v. stiff @ 2' (highly compacted)			
3–4				Sand content increases @ 3' to ~20%, occasional gravel (up to 1"), color changes (gradually) becoming light yellowish brown by 4'			
4–6	N/A	Drive 4-6' Rec 2'	N/A	Sand content increases to ~30% @ 4.5' becomes SANDY SILT to SILTY SAND @ 5' ~5.8' (gradual contact. Sand is v. fine to fine, light yellowish brown, ~~50%~~ 40% silt ~~~40%~~ ~60% sand, 5-10% gravel, trace clay, trace organic material, trace calcite.	SM/ML		0.0
6–8				TD = 6' No evidence of contamination, no unusual colors, odors, or stains			
9							
10							

Sheet 1 of 1

CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

TETRA TECH EM INC. SOIL BORING AND WELL INSTALLATION LOG

Boring Number: 6B 21	Date Started/Completed: 7/19/00
Drilling Method: GEOPROBE	Location Sketch:
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft bgs., date) N/A	
Driller: ED SVABODA	
Logged By: C GERMAN	



Soil Boring GB 21

Lithologic Description

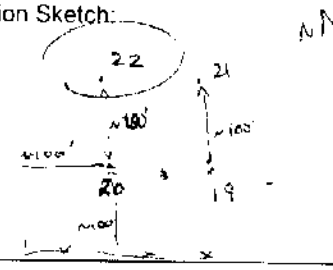
Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–4	N/A	Drive 0-4' Rec. 4'	N/A	TOPSOIL, GRAVEL, SILT (6") SILT, brown, dry, med. stiff, ~10% sand, ~5-10% fine gravel, ~20% clay (up to 0.5") becomes GRAVELLY SILT @ 1.5' gravel content increases to ~15-20%, becomes coarser (up to 2.5") clasts include chert + gabbroic? compositions; rounded to subrounded.	ML	N/A	0.0 / 0.0
				~3.0 Sand content increases with depth to ~30% @ 2.5' becomes SILTY SAND @ 3' (gradual contact) ~40-50% v. fine to fine sand, light yellowish brown, dry, poorly graded, ~10% fine gravel (up to 0.5"), subrounded, ~30-40% silt, trace clay. Material is very well compacted, nearly lithified.	SM/ML		
4–6	N/A	Drive 4-6' Rec. 2'	N/A				
6				TD=6' No evidence of contamination observed.			

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: AOC # 1
Project: NWS CONCORD

Boring Number: GB22	Date Started/Completed: 7/19/00
Drilling Method: GEOPROBE	Location Sketch:
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date): N/A	
Driller: ED SVADOBA (FAST TEK)	
Logged By: C. GORMAN	



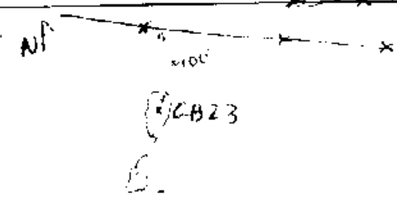
Soil Boring GB22

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–2	N/A	Drive 0-4' Rec 4'	N/A	GRAVEL, SILT, + TOP SOIL (6") SILT WITH GRAVEL, brown, dry, med stiff, ~10-15% gravel (up to 1.5"), rounded to subrounded, 5-10% sand (fine to v. fine), ~10% clay.	ML	N/A	0.0
2–4				(gradational) ~2.0 Sand content increases to ~20% @ 2'. Color changes (gradually) to light yellowish brown. Gravel content and grainsize decrease to ~5% and up to 0.5" diameter clasts, trace calcite, trace organic material (rootlets) [SANDY SILT to SILTY SAND]	SM/ML		0.0
4–6	N/A	Drive 4-6' Rec 2'	N/A	Sand content increases with depth to ~50% @ 4' (~50% silt), trace clay, trace organic material. Sand is fine to v. fine. becomes sli. moist @ ~5.5'			0.0
6–10				TD=6' No visible evidence of contamination No discoloration, stain, or odor.			

TETRA TECH EM INC. **SOIL BORING AND WELL INSTALLATION LOG**

CTO: 267
Bldg./Site: ACC #1
Project: NWS CONCORD

Boring Number: GB 23	Date Started/Completed: 7/19/00
Drilling Method: GEOPROBE	Location Sketch:
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date) N/A	
Driller: E. SVADOBA (FAST TEK)	
Logged By: C GORMAN	



TIME on 7/26

Soil Boring GB23

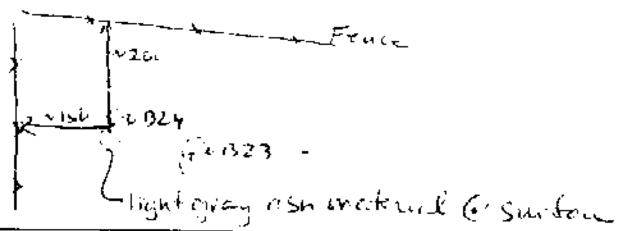
Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	~~Blow Count (per 6 Inches)~~ TIME	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
				No visible signs of contamination, no staining or discoloration beyond surface (0.5"). Surficial discoloration - likely due to water pending.			
~~001~~	267ACC-SS001	Drive 0-4'	~~TIME:~~ 1045	GRAVEL + TOPSOIL @ SURFACE (3") - NO VISIBLE discoloration (layer must be ≤0.5" Thick)	ML	N/A	0.0
002	SS002	Rec. 4'	1050	SILT, brown, sli moist, med stiff ~~clay~~ ~20% clay, trace gravel (up to 0.5")			
2				clay content increases w/ depth to ~30% @ 2.5'			
3.5 003	003		1055	(No evidence of contamination observed).			
3							
4				7/26/00 - Co-LOCATED ON GB23 Drive to 6' (full recovery) To collect Encore Samples for VOCs. ~~0.0-0.5 = 001~~ NO VOA = Surface sample; 0.5-1.0 = 002 (1345); 2.0-2.5 = 003 (1350)			
5							
6				TD=6.0' on 7/26/00			
7				SAND content incr w/ depth to ~15% @ 4.5' (SANDY SILT w/ CLAY), trace gravel, trace organic material.			
8							
9							
10							

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: ACC # 1
Project: NWS Concord

Boring Number: 6B 24	Date Started/Completed: 7/19/00
Drilling Method: GEOPROBE	Location Sketch:
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date): N/A	
Driller: E. Svadoba (FAST TEK)	
Logged By: C. German	



TIME on 7/26/00

Soil Boring 6B24

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	~~Blow Count (per 6 inches)~~ TIME	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
004A	~~004~~	Drive 0-4	1105	Light gray ash @ surface w/ coarse gravel (extends to ~1.0') (gray, angular, up to >2") and concrete (0-0.5')	GM	N/A	0.0
~~005A~~	~~005~~	Rec	1105	Concrete fragments continue to ~1.5' (poss.	GM + concrete		
005A		3.6'		pushed down in sleeve?)			
2	006		1110	@ 1.5' - becomes light yellowish brown SILTY SAND to SAND (well sorted, medium sand)	SM/SP		
3				@ 2.5' - 6" layer of fine-to-med-grained white to gray sand w/ 3" gravel above it (angular, road bed material?) = BACKFILL?	SP w/ gravel		0.0
4		Drive 4-6 Rec 2'		Sand + gravel (intermixed) continue to ~5.5' (BACKFILL MATERIAL?)			
5				~~Possible ash like material (see example sample) between 5.0-4.5 - but may be curing place along inside of sleeve~~			
6				WET @ 5' - MATERIAL = Concrete-like when dry	SM		
7				TD=6' @ 5.5 - SILTY SAND, sl. moist, yellowish brown (as above) ~30% silt, trace clay.			
8							
9							
10							

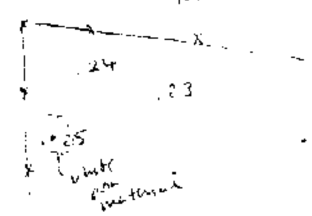
7/26/00 - Co-locate 18" E of 6B24: [drive to 2.5' - Full recovery]
Drive 0-2 - refusal @ 2.0' - relocate 18" N - refusal @ 2.5
Resample 0-1' interval (ASH + just below ASH)
004A (0-0.5) and 005A (1.0-1.5) → Ash intermixed w/ Angular gravel + sand extends to ~1.0' [gravel = concrete fragments]
becomes yellowish-brown SAND @ 1.5'
Rebar in drill bit @ 2.5' [LIKELY SUBSURFACE RE-INFORCED CONCRETE/REBAR FOUNDATION]

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

Boring Number: 6B25	Date Started/Completed: 7/19/00
Drilling Method: GEOPROBE	Location Sketch: N↑
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date) N/A	
Driller: E. SVADEBA (FAST TEK)	
Logged By: C. GLAMAN	



Soil Boring 6B25

Lithologic Description

TIME on 7/26/00

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	~~Blow Count (per 6 inches)~~ TIME	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
1320 007A	~~007~~	Drive 0-4	1130	GYPSUM SAND - V. fine sand/ash, V. light gray; 0-0.5' SURFACE = white/light gray ~~ash-like~~ material (≤3"?)	SP	N/A	0.0
1332 ~~008A~~	~~008~~	Rec	1135	SILT w/ SAND dark brown, v. stiff, ~~compact~~ ~ 20% clay, trace sand (up to 15%), trace gravel.	0.75 ~~ML~~ ML		
2	~~009~~		1140	Sand content increases with depth to ~20%. @ 2' color gradually changes to ~~light~~ dark yellowish brown [SANDY SILT w/ ~10% clay].			
3 1339 009A				material is very compacted (hard drilling)			
4				Clay content incr w/ depth to ~15% @ 4'. Becomes v stiff			
5	N/A	Drive 4-6 Rec.	N/A	Note: ash-like material coats outside sample (along sleeve) all the way to 6,' due to drag down sleeve. = SILTY SAND to SANDY SILT w/ Clay @ 5.5'	5.5 ML/SM		0.0
6				TD = 6' [Drive to 6' (full recovery)]			
7				7/26/00 - Co-locate @ 6B25 - Resample 0-1' interval: 0.0-0.5' = light gray gypsum sand (v. fine w/ ashy component) [PHOTOS - 4]			
8				0.75-1.25 = Dark brown SILT w/ SAND [from 0.75' to ~1.5'] gradually becomes SANDY SILT (see above)			
9				Samples 007A - 0-0.5 008A - 0.75-1.25 009A - 3.0-3.5			
10							

Sheet 1 of 1

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 207
Bldg./Site: Acc #1
Project: NWS CONCORD

Boring Number: 6B26	Date Started/Completed: 7/19/00
Drilling Method: GEOPROBE	Location Sketch: GRID LOC A2
Outer Diameter of Boring: 2"	27 (@26) N
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date) N/A	28 29 30 31
Driller: E. SVADOBA (FAST TEK)	
Logged By: C. GORMAN	35 34 X33 X32

TIME on 7/26/00

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	~~Blow Count (per 6 inches)~~ TIME	Soil Boring 6B26 Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–4	N/A; 1.5-2.0 Ø65; 2.25-2.75 Ø66	Drive 0-4' Rec. 3'		GRAVEL, SILT, AND TOPSOIL (6") ~~SILT~~ SANDY SILT, yellowish brown, dry, med loose. trace gravel (up to 0.5"), fine to v. fine sand (~40-50%), ~30-40% silt. 7/26/00 - Gypsum sand @ 1.5' [PHOTOS] new disk. Sand content increases with depth, becomes SILTY SAND (gradually) about 3.5'	ML/SM	N/A	0.0
4–6	NA; Ø67	Drive 4-6' Rec. 2'	1205	6"-8" of white/gray fine sand with gravel @ 5' gypsum sand (~~poss backfill material~~) ~~Collected temporary sample~~ 0.0 PID	SM/ML		0.0
6–10				TD=6' New Samples 1.5-2.0' - Ø65 (gypsum sand) (1515) 2.25-2.75' - Ø66 (soil below gypsum) (1520) 4.25-4.75 - Ø67 (soil 2' below - trace gypsum) 1525			

CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

Boring Number: 6B27	Date Started/Completed: 7/19/00
Drilling Method: GEOPROBE	Location Sketch: GRID LOC. A 1
Outer Diameter of Boring: 2"	·27 ·26
Inner Diameter of Well Casing: N/A	·28 ·29 ·30 ·31 N
Depth to Water (ft. bgs., date) N/A	
Driller: E. SVADOBA (FAST TEK)	
Logged By: C GORMAN	

TIME (– 7/26)

Soil Boring 6B27

new sample Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	~~Blow Count (per 6 inches)~~ TIME	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
		Drive 0-2'		Refusal @ ~2' - relocated w/in 3' twice - consistent refusal (concrete?) @ ~2'	ML	N/A	0.0
1	~~6B~~ 016		1215				
(1440) 010A		Rec. 0-2'		GRAVEL + SILT / TOPSOIL @ SURFACE (3") @ ~3" – 1' SILT with v fine powdery gray/brown material (ASH?) – Sample collected @ ~1215	ML/SM		
(1440) 2 062							
(1440) 063				SANDY SILT, brown, med loose, trace gravel, ~30% sand. GRAVEL @ 2' (poss concrete fragment)	SM		
3 ~~[illegible]~~				TD = 2' (REFUSAL)			
(1445) 4 ~~065~~ 064							
5				7/26/00 - Relocate ~15' N of 6B27 [Drive to 6' full recovery] TOP 1.0' = Sluff + gravel/topsoil. Ash is @ ~1.0' bgs, but loc = approx due to hand drilling			
6				collected 1.0-1.5 - (ASH) = 010; 1.5-2.0 - Soil w/ Gypsum Sand (trace ash on outside of sleeve). = 062; 2.0-2.5 = Plaster? = 063 (1440); 3.5-4.0 - SOIL = Brown Silt w/ Sand (~20%) trace gypsum sand (glints in sun) = 064 (1445)			
7							
8				LOG NOTES: lithified gypsum (?) @ 2' [= brown rock w/ crystaline gypsum along veinlets - see example sample]			
9				white Chalky material @ 2.0-2.5' [plaster?] - SAMPLED - # 063 (in jar)			
10				= sli moist to wet [has brown paper on 2 sides]			

[PHOTOS - ENDOF DISK]

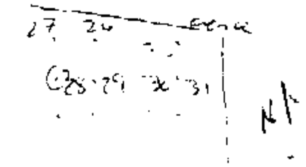
Brown SILT @ 4' - sli moist, loose, trace gypsum sand to 6!

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: ACC #1
Project: NWS Concord

Boring Number: GB 28	Date Started/Completed:
Drilling Method: Geoprobe	Location Sketch: Grid Loc B1
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date) N/A	
Driller: E. Svadoba (Fast Tek)	
Logged By: C. Gorman	



Soil Boring GB28

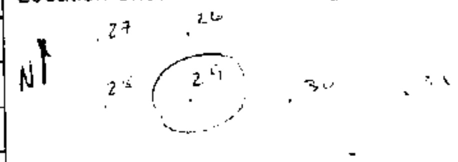
Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–4 (Ø59, Ø6Ø, Ø61)	~~N/A~~	Drive 0-4 Rec 4'	N/A	TOPSOIL + SILT w/ GRAVEL (6") SILT, brown, dry, hard, ~20% clay, ~15% sand (Poss v. thin layer of ash-like material @ 0.5' (<2" thick)) Clay content increases @ 2' to ~30% becomes v. stiff (Sl. moist @ 3') Sand content increases gradually with depth to ~25% @ 4'	ML	N/A	0.0
4–6	~~N/A~~	Drive 4-6' Rec 2'	N/A	Becomes SANDY SILT WITH CLAY @ ~4' (~20% clay ~25% ~~silt~~ sand), trace calcite/caliche			0.0
6–10				TD = 6' No visible evidence of contam. (ash or gypsum) Co-located on 7/26/00 [Ø59] - Collect sample @ 0.5-1.0' - likely v. thin layer of ash-like material (<2" thick) - Collected in jar - Silt just below [Ø6Ø] collected. + 2' below [Ø61] 0.5-1.0 = Ø59 - 1355 1.0-1.5 = Ø6Ø - 14ØØ 3.0-3.5 = Ø61 - 14Ø5			

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

Boring Number: 6B29	Date Started/Completed: 7/19/00
Drilling Method: GEOPROBE	Location Sketch: GRID LOC B2
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date): N/A	
Driller: E. SVADOBA (FAST TEK)	
Logged By: C. GORMAN	



TIME C. 7/26

Soil Boring 6B29

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches) TIME	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
1410 Ø11A	Ø11	Drive 0-4 Rec 4'	1245	TOPSOIL + GRAVEL/SILT @ SURFACE (6") 2"-6" LAYER OF ASH-LIKE MATERIAL (light gray, v. fine) @ ~36" ~~[illegible]~~ ↑6-8" Thick on 7/26		N/A	0.0
0.75	012		1250	stiff to v. stiff SILT, brown, sli. moist, ~20% clay (sh. plasticity), w/10% sand	ML		
1 1415 Ø12A 1.25							
2	Ø13		1300				
3 1420 Ø13A				Sand content increases with depth to ~15% @ 3.5' color gradually changes to light yellowish brown [SANDY SILT w/ CLAY]			
4				Sand content increases w/ depth — gradational			0.0
5	N/A	Drive 4-6' Rec 2'		becomes SILTY SAND @ ~4.5'	SM/ML	↓	
6							
7				TD=6' 7/26/00 - Co-LOCATE on 6B29 collect Ø11A - 0.0-0.5 (1410) Ø12A - 0.75-1.25 (1415) Ø13A - 2.75-3.25 (1420)			
8							
9							
10							

Sheet 1 of 1

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: ACC #1
Project: NWS CONCORD

Boring Number: GB30	Date Started/Completed: 7/19/00
Drilling Method: GEOPROBE	Location Sketch: GRID LOC B3
Outer Diameter of Boring: 2"	.27 .26
Inner Diameter of Well Casing: N/A	.28 .29 (.30) .31
Depth to Water (ft. bgs., date) N/A	.35 .34 .33 . .32
Driller: E. SVADOBA (FAST TEK)	
Logged By: C. GORMAN	

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	~~Blow Count (per 6 inches)~~ TIME	Soil Boring GB30 Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
1 014	014	Drive 0-4' Recov 3.5'	1310	GRAVEL + TOP SOIL (6") Possible ~~gypsum~~ ASH-LIKE MATERIAL @ 0.5-1' NOT ASH = gypsum (~2" THICK - distributed along sleeve of sample) SILT; dark brown, dry, ~10% sand, ~20% clay, periodic pockets of fine gray sand @ ~1.5' ~~(fill material?)~~ - usually ≤ 0.5" thick (GYPSUM SAND)	ML	N/A	0.0
2 015	015		1312				
3 016	016		1315	becomes sli. moist @ 2.5' Gypsum sand is darker gray (intermixed w/ soil) w/ depth - extends to			
4							
5	N/A	Drive 4-6' Rec. 2'		(as above)			0.0
6 068				6" Lens of white/gray (Pure - not mixed w/ soil) gypsum sand @ 5-5.5' - SAMPLED (in jar) [PHOTOS. Focal + wide angle] trace gypsum sand to 6! (sli moist) TD = 6'	5.0' SP / ML		
7							
8							
9							
10							

TETRA TECH EM INC. **SOIL BORING AND WELL INSTALLATION LOG**

CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

Boring Number: GB 31	Date Started/Completed: 7/19/00
Drilling Method: GEOPROBE	Location Sketch: GRID LOC B4 27 . 26 28 29 30 31
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date) N/A	
Driller: E. SVADOBA (FAST TEK)	
Logged By: C. GORMAN	

Soil Boring GB 31

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–4	N/A	Drive 0-4' Rec 4'	N/A	TOPSOIL + SILT/GRAVEL @ SURFACE SILT, brown, dry, med. loose, ~15% clay, ~15% sand, trace gravel, trace organic material. no evidence of ash or contaminant material. Clasts of "lithified gypsum" @ 1.5' (up to 2") Several clarge rock fragments >2" throughout interval. pockets of gypsum sand (v. fine) from 3-6' (= weathered gypsum).	ML		0.0
4–6	N/A	Drive 4-6' Rec 2'	N/A				0.0
6–10				TD=6' 7/26/00 Colocated @ GB31 → no Contam. observed.			

Sheet 1 of 1

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: AOC #1
Project: NWS Concord

Boring Number: GB32	Date Started/Completed:
Drilling Method: GEOPROBE	Location Sketch: GRID LOC C4
Outer Diameter of Boring: 2"	N 28 29 30 31
Inner Diameter of Well Casing: N/A	32
Depth to Water (ft. bgs., date) N/A	
Driller: E. SVADOBA (FAST TEK)	
Logged By: C. GORMAN	

Soil Boring GB32

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
		ca		Refusal @ 1' (Concrete?)			
1	069	069	1630	→ relocate 3' to W + 3' to NW (twice)	1.0 ASH/ML	N/A	0.0
	070		1635	Consistent refusal on concrete @ 18" (Conveyor belt foundation?)	ML		
2				Refusal @ 2.5' on concrete			
3				Relocate 30' to E – refusal @ 2.5' (next to fire road)			
				6" - TOPSOIL + GRASS			
4				Rootlets + ASH MATERIAL to 1.0' - likely mixed w/ topsoil + silt.			
5				SILT with gypsum sand 1.0 – 2.5 (pockets of sand throughout interval.			
6				TD = 2.5'			
7							
8							
9							
10							

CTO: 267
Bldg./Site: ACC #1
Project: NWS CONCORD

TETRA TECH EM INC. SOIL BORING AND WELL INSTALLATION LOG

Boring Number: GB 33	Date Started/Completed: 7/19/00
Drilling Method: GEOPROBE	Location Sketch: GRID LOC C3
Outer Diameter of Boring: 2"	27 26
Inner Diameter of Well Casing: N/A	28 29 30 31
Depth to Water (ft. bgs., date) N/A	X33 X32
Driller: E. SVADCBA (FAST TEK)	
Logged By: C. ELAMAN	

Soil Boring GB 33

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
		Drive 0-2'		Refusal on concrete @ 3" - relocate ~10' to N.	0.5'		
1	071	Rec 2	1640	Refusal on concrete - drill through 10"-12" on concrete - abandon location.	1.0' ASH		
	072		1645		ML		
2				~~Colocate on 8/26/00. Refusal 2x more (3' then 15' to E) Concrete under entire area.~~			
3		Drive 2-6'		Colocate on 7/26/00 ~30' SW of GB33 [Drive 6', full recovery]			
	073	Rec. 4'	1650	0-6" - Topsoil + grass			
4				6"-1.0 = ASH LIKE material w/ roots + Silt	4.0'		
				@1.0 - SILT brown, sl. moist, stiff, ~20% clay, ~10% sand, trace gravel (up to 2" - rounded). Sand content incr. w/ depth	SM/ML		
5							
6				SILTY SAND w/ Clay @4', yellowish brown, med. to fine sand, trace gravel (up to 0.5")			
7				TD = 6'			
8							
9							
10							

TETRA TECH EM INC. **SOIL BORING AND WELL INSTALLATION LOG**

CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

Boring Number: GB34	Date Started/Completed: 7/24/00
Drilling Method: GEOPROBE	Location Sketch: GRID LOC. C2
Outer Diameter of Boring: 2"	.28 .29 .30 .31
Inner Diameter of Well Casing: N/A	.35 (.34) x33 x32
Depth to Water (ft. bgs., date) N/A	.36
Driller: E. SVADIBA (FAST TEK)	
Logged By: C. GURMAN	

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	~~Blow Count (per 6 inches)~~ TIME	Soil Boring GB34 Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
	017A ~~074~~	Drive 0-4	1700	TOPSOIL, SILT + GRAVEL (0.5') 0.5' 0.25'	ASH		0.0
1	018A ~~075~~	Rec 4'	1705	SILT, dark brown, dry, stiff, ~30% clay, 10% sand, trace gravel. Top 1.5' = fine laminae. [Source of ASH-LIKE MATERIAL MAY BE ANYWHERE FROM ~1.5 TO ~3.5' – IT IS PRESENT ALL ALONG INSIDE OF ACETATE SLEEVE & OUTSIDE SAMPLE]	ML	N/A	
2							
3	019A (1710)			Clay content increases with depth to ~35% @ 2.5'+ becomes v. stiff, slight plasticity.			
	~~076~~ ~~017~~		1515				
4	~~018~~		1517	Sand content increases with depth to ~30% @ 4'. [SANDY SILT]			
5		Drive 4-6 Rec 2'					0.0
6	~~019~~		1520				
7				TD=6' 7/26/00 Co-locate - drive to 6' (full recovery). Thin layers (<2") ASH MATERIAL present @ 0.25–0.5'. Sample (in jar) – JUST @ top. NOT present @ 3' – but does sluff along sleeve.			
8				New Samples			
9				Ø17A 0.25-0.5 – Ash Ø18A 0.5-1.0 – Just below Ø19A 3.0-3.5 – 2' below			
10							

Sheet 1 of 1

TETRA TECH EM INC. **SOIL BORING AND WELL INSTALLATION LOG**

CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

Boring Number: GB35	Date Started/Completed: 7/19/00
Drilling Method: GEOPROBE	Location Sketch: GRIDLOCK C1 (27 26 / 28 29 30 31 / 35 34 33 32; N)
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date): N/A	
Driller: E. SVADLBA (FAST TEK)	
Logged By: C. GERMAN	

Soil Boring GB35

Lithologic Description

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	~~Blow Count (per 6 inches)~~ TIME	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
		Drive 0-4		TOPSOIL @ SURFACE (6")			
~~020A~~	020	Rec	1540	@ 6" - fine brownish ASH MATERIAL (?) present within SILT - brown, firm, dry, ~20% Clay	ML/ASH	N/A	
021A	021	4'	1545	@ 1.0' Pockets of light gray gypsum sand - fresh - within silt (heterogeneous) with ASH MATERIAL along outside of sleeve.	ML (4 gyp SAND)		
2 074							
3							
~~022A~~				Clay content increases with depth to ~30% @ 4' med. plasticity, v. stiff CLAYEY SILT.			
4 022A							
5		Drive 4-6' Rec 2'		Sand content incr. @ 5' to ~20% (CLAYEY SILT w/SAND) (gradational 5.5')			
6	022		1550	SILTY SAND @ 5.5' (Yellowish brown)	SM/ML		
7				TD=6' 7/26/00 Co-located + resampled 020A (0.5-1.0) + 021A (1.0-1.5) to ensure quality samples to lab.			
8				~~022 sample co~~ 022A @ 3.5'-4.0' [SILT]			
9				+ 074 - new sample @ 1.5-2.0' (just below gypsum)			
10				PHOTOS - Ash w/ gypsum sand underneath - Pretty typical occurrance.			

+ PHOTOS of ENCORE Sampling in action.

Sheet 1 of 1

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: ACC #1
Project: NWS CONCORD

Boring Number: GB36	Date Started/Completed: 7/19/00
Drilling Method: GEOPROBE	Location Sketch: GRID LOC D1
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date) N/A	
Driller: E. SVADOBA (FAST TEK)	
Logged By: C. GORMAN	

Location sketch: ·28 ·29 ·30 ·31 N
·35 ·34 ·33 ·32
·36

Soil Boring GB36

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	~~Blow Count (per 6 inches)~~ TIME	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
		Drive 0-4'		Grass, Topsoil, SILT + GRAVEL @ SURFACE (6")			
023A	023	Rec. 4'	1600	@6" - FINE ASH-LIKE MATERIAL (light brown/gray) present w/in SILT interval.	ASH/ML	N/A	0.0
024A	024		1602	SILT, brown, dry, ~~20%~~ ~10% clay, med stiff to v. stiff (@2'), trace gravel, trace sand.	ML		
2							
3							
	025	1640 VOAs	1605				
4				gravel lens @ 3.75' (0.25' thick) = gravelly ~~clay~~ silt ~30% gravel (up to 1") in silt matrix. Gravel = round to subround.	SM/ML		0.0
5		Drive 4-6' Rec 2'		Sand content increases w/ depth to ~20% @4' color changes to yellowish brown. becomes SANDY SILT to SILTY SAND @ ~~5'~~ 4' (~30-~~40~~ 50% sand)	ML/SM		
6				Hard @ 6' TD=6'			
7				Co-locate 7/26/00 to collect top 2 samples again + get VOAs on 025			
8				023A - 0.5-1.0 - Ash			
9				024A - 1.0-1.5 - just below (Silt)			
10				025 - for VOCs only (Silty sand)			

TETRA TECH EM INC. **SOIL BORING AND WELL INSTALLATION LOG**

CTO: 267
Bldg./Site: AOC #1
Project: NWS Concord

Boring Number: GB37	Date Started/Completed: 7/19/00
Drilling Method: GEOPROBE	Location Sketch: GRID LOC D2
Outer Diameter of Boring: 2"	27 26 / 28 29 30 31 / 35 34 X33 X32 / 36 37 38 39 (N)
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date) N/A	
Driller: E. SVAGORA (FAST TEK)	
Logged By: C GORMAN	

7/26

Soil Boring GB37

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	~~Blow Count (per 6 inches)~~ TIME	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
		DRIVE 0-4 Rec 4'		GRASS, TOPSOIL, GRAVEL/SILT @ SURFACE (6")			0.0
0.75				Fine ash material just above SILT @ ~0.75' v thin layer (2-3")	ASH	NA	
1 ~~026A~~	026		1621	SILT, brown, dry, stiff, ~20% clay, ~10% sand well compacted.	ML		
~~027~~ 1.75	027		1623				
2							
3							
028	028	1650	1625				
4		DRIVE 4-6 Rec 2'		SANDY SILT to SILTY SAND by 4.0' - Color gradually changes to yellowish brown. Clay content decreases to ~10%.	ML/SM		0.0
5							
6				TD=6'			
7				Co-Located 7/26/00 to re-sample			
8				026A - Ash (0.75-1.25) ~~#27A - just below ash (silty gravel up to 2" loose, dry)~~	NOT SAMPLED [MISSED VOC]		
9				~~027~~ 028 - VOC only (3.25-3.75)			
10							

TETRA TECH EM INC. **SOIL BORING AND WELL INSTALLATION LOG**

CTO: 2C7
Bldg./Site: ACC #1
Project: NWS CONCORD

Boring Number: GB38	Date Started/Completed: 7/19/00
Drilling Method: GEOPROBE	Location Sketch: GRID LOC D3
Outer Diameter of Boring: 2"	N ↑ 28 29 30 31
Inner Diameter of Well Casing: N/A	35 34 33 32
Depth to Water (ft. bgs, date) NA	36 37 38 39
Driller: E. SVAUBA (EAST TEK)	
Logged By: C. GORMAN	

Soil Boring GB38

Lithologic Description

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
		Drive 0-2'		Refusal @ 6"			0.0
1	075	Rec 2'	1730	Relocate 15' S - refusal again } 25' refusal (Concrete)	ASH	N/A	
	076		1735	" 10' N - refusal			
2				Abandon boring Co-located on 7/26/00 ~25' N of GB38 ~~Refusal~~	ML		
3		Drive 2-6'		Grass + soil surface (6")			
	077	Rec. 4'	1740	0.5 - 1.0 = ASH			
4				1.0 - 1.5 = just below (SILT, brown, dry, trace gravel) 3.5'			0.0
				3.0 - 3.5 - 2' below (SILT - brown, dry, stiff)	SM		
5				@ 3.5' Sand content incr. to ~50%. (SILTY SAND).			
6							
				TD=6'			
7							
8							
9							
10							

TETRA TECH EM INC. SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: ACC #1
Project: NWS CONCORD

Boring Number: GB 39	Date Started/Completed: 7/19/00
Drilling Method: GEOPROBE	Location Sketch: GRID LOC D4
Outer Diameter of Boring: 2"	N •28 •29 •30 •31
Inner Diameter of Well Casing: N/A	•35 •34 X33 X32
Depth to Water (ft. bgs., date) N/A	•36 •37 •38 •39
Driller: E. SVADOBA (FAST TEK)	
Logged By: C. GERMAN	

Soil Boring GB 39

Lithologic Description

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	~~Blow Count (per 6 inches)~~ TIME	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
		Drive 0-4 Rec. 4'		TOPSOIL, Gravel + SILT @ surface (6")			
1.0-1.5	Ø29		1648	fine ash appears to have slumped to the bottom of the drive, may still be present @ ~0.5-1.0'	ML w/ASH	N/A	0.0
0.5-1.0	Ø3Ø		1650	SILT, brown, dry, med to v. stiff, ~10% sand, ~20% clay	ML		
2				clay content, stiffness, increase @ 2' ~30% clay			
3							
3.5 VOC	Ø31		1700				
4				color changes (gradually) to yellowish brown (mottled w/ greenish brown)			0.0
5	N/A	Drive 4-6 Rec. 2'	N/A				
6				TD=6'			
7				7/24/00 Co-locate recollect 0.5-1.0 Ø29A - Ash; 1.0-1.5 Ø3ØA - below; 3.0-3.5 - Ø31 - VOC only.			
8							
9							
10							

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Sheet 1 of 1

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: AOC #1
Project: NWS Concord

Boring Number: GB 40	Date Started/Completed: 7/26/00
Drilling Method: GEOPROBE	Location Sketch: GRID LOC E4
Outer Diameter of Boring: 2"	N 36 37 38 .39
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date) N/A	.43 .42 .41 .40
Driller: ED SVOBODA (FAST TEK)	
Logged By: C. GORMAN	

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Soil Boring GB40 Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
		Drive 4" no Rec.		Refusal on concrete @ ~3"-4" three times relocate 2X to S 10' + to E 10' Abandoned Location.		N/A	0.0
1							
2							
3							
4							
5							
6				CG			
7							
8							
9							
10							

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

Boring Number: GB41	Date Started/Completed: 7/26/00
Drilling Method: GEOPROBE	Location Sketch: GRID LOC. E3
Outer Diameter of Boring: 2"	N
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date)	43 42 •41 •40
Driller: ED	
Logged By: C. GERMAN	

Soil Boring GB41

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
		Drive 0-8" No rec		Refusal @ 8" relocate 10' W - refusal @ 4" relocate 10' S - refusal Abandoned Location		N/A	0.0
1							
2							
3							
4							
5				CG			
6							
7							
8							
9							
10							

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

Boring Number: GB 42	Date Started/Completed: 7/26/00
Drilling Method: GEOPROBE	Location Sketch: N ↑ GRID LOC E2
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: NA	
Depth to Water (ft bgs., date) NA	43 42 41 40
Driller: ED SVODABA (FAST TEK)	
Logged By: C GORMAN	

Soil Boring GB42

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	~~Blow Count (per 6 inches)~~ TIME	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
	031	Drive 0-4' Rec 4'		Grass + Topsoil (3")			
1	032		0840	Fine ASH, light brownish (grayish) @ 6" - sampled (collected in jar + w/ Encore sampler) 1.0'	ASH w/ silt	N/A	0.0
	033		0845	SILT @ 1.0' - dark brown dry, med stiff, trace gravel (up to 0.2"), ~20% clay, ~5% sand	ML		
2							
				gravel up to 1" @ 2' (rounded to subrounded pebbles)			
3							
	034		0850				
4				becomes sli moist @ ~3.5' Sand content increases w/ depth to ~15% @ 4'			
		Drive 4-6 Rec 2'		SANDY SILT to SILTY SAND @ 4.5' 4.5			
5				yellowish brown, sli moist to dry, med to fine sand (~50%) ~50% silt, trace clay.	ML/SM		0.0
				Clay content increases to ~10% @ 5.5', sand content decreases to ~40%			
6				TD = 6'			
7							
8							
9							
10							

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 207
Bldg./Site: ALC #1
Project: NWS CONCORD

Boring Number: GB43	Date Started/Completed: 7/26/00
Drilling Method: GEOPROBE	Location Sketch: GRIDLOC E1
Outer Diameter of Boring: 2"	N
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date) N/A	43 42 41 40
Driller: E. SWDABA (EAST TEK)	
Logged By: C. GORMAN	

Soil Boring GB43

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	~~Blow Count (per 6 Inches)~~ CO- TIME	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0.25 – 0.75	Ø35	Drive 0-2' Rec 2'	Ø915	TOPSOIL + GRASS (3") FINE ASH @ 3" – just below grass (@ surface)/~3 to 6")		N/A	0.0
0.75 – 1.25	Ø36		Ø920	SILT @ 8", brown, dry, stiff, ~20% clay, ~5% sand, trace gravel (up to 1") rounded to subrounded.	ML		
2				becomes sli moist @ 2' Clay content increases to 30%, med. plasticity			
2.75 – 3.25	Ø37	Drive 2-6 Rec 4'	Ø925	Sand content incr. @ 3' to ~15%			
4				gradational (4.0') SILTY SAND to SANDY SILT @ 4' Yellowish brown (sandy portions) to dark brown (silty) – mottled, sli moist.	SM/ML		
5							
6				TD=6'			
7							
8							
9							
10							

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: AOC #1
Project: UWS CONCORD

Boring Number: GB44	Date Started/Completed: 7/26/02
Drilling Method: GEOPROBE	Location Sketch: GRID LOC F1
Outer Diameter of Boring: 2"	N
Inner Diameter of Well Casing: N/A	43 42 41 40
Depth to Water (ft. bgs., date) N/A	44
Driller: E. SVOBODA (FAST TEK)	
Logged By: C. GORMAN	

Soil Boring GB44

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	~~Blow Count (per 6 inches)~~ TIME	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0.25		Drive		2" Grass + top soil			
0.5	038	0-2'	1010	ASH @ 2" (~4" thick) - collected in jar (0.25'-0.5')	0.5'	N/A	0.0
		Rec		PHOTOS OF TOP DRIVE + ASH			
1	039	2'	1015	(0.5-1.0') SILT @ 0.5', brown, dry, stiff, 10% clay, trace gravel (rounded), trace sand)	ML		
2				becomes slt moist @ 2', clay content incr to 30% @ 2.5'			
		Drive 2-6					
3	040	Rec 4'	1020				
				Sand content increases @ 3' to ~15% (~20% clay)			
4							
5							
6				TD 6'			
7							
8							
9							
10							

TETRA TECH EM INC. **SOIL BORING AND WELL INSTALLATION LOG**

CTO: 267
Bldg./Site: AOC #1
Project: NWS (CONCORD)

Boring Number: GB45	Date Started/Completed: 7/26/00
Drilling Method: GEOPROBE	Location Sketch: GRID LOC F2-
Outer Diameter of Boring: 2"	N 43 42 41 40
Inner Diameter of Well Casing: N/A	44 45
Depth to Water (ft. bgs., date) N/A	
Driller: E. SVOBODA (FAST TEK)	
Logged By: C. GORMAN	

Soil Boring GB45

Lithologic Description

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	~~Blow Count (per 6 inches)~~ TIME	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
		Drive 0-2' Rec. 2'		0-2" GRASS + TOPSOIL		N/A	0.0
	Ø41		1025	ASH @ 2" (~3-6" thick) - distributed across interval from 0.25 to 1.5' - Sample represents 0.25 to 1.0'			
1				Lense of SILT @ 1.0' to 1.25'	ML		
				1.5'			
2	Ø42		1030	SILT, brown, dry, stiff hard, ~15% clay, trace gravel (up to 1", subround), trace to 10% sand	ML		
3		Drive 2-6' Rec. 4'		Becomes v stiff @ 3' gravel content increases to ~10% - med to fine gravel, up to 0.5", subround. Color gradually changes to yellowish-brown			
4	Ø43		1035	Sand content incr to ~10% @ 4' (SANDY CLAYEY SILT)			
5							
6				TD = 6'			
7							
8							
9							
10							

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: AOC # 1
Project: NWS CONCORD

Boring Number: GB46	Date Started/Completed: 7/26/02
Drilling Method: GEOPROBE	Location Sketch: GRID LOC. F3
Outer Diameter of Boring: 2"	N
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date) N/A	
Driller: E. SUDABA (FAST TEK)	
Logged By: C. GORMAN	

Soil Boring GB46

Lithologic Description

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	~~Blow Count (per 6 inches)~~ TIME	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
	044	Drive 0-2'	1040	Topsoil + grass @ surface to ~3" very thin hard ash ~1/8" thick - represents former surface? @ ~3" just below topsoil. Ash layer ~4"-6" thick. 0.75'		N/A	0.0
1	045	Rec 2'	1045	SILT @ 0.75', brown, dry, stiff, ~10% clay, ~5% sand, 5% gravel (subround, up to 1/4")	ML		
2		Drive 2-6'		gravel content increases @ 2' to ~10% med gravel clay content increases to ~30%, becomes v. stiff			
3	046	Rec 4'	1050				
4				Sand content increases @ 4' to ~15% fine to med sand. Still ~10% gravel as above, ~30% clay. (SANDY CLAYEY SILT)			
5							
6				TD=6'			
7							
8							
9							
10							

TETRA TECH EM INC. **SOIL BORING AND WELL INSTALLATION LOG**

CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

Boring Number: GB 47	Date Started/Completed: 7/26/00
Drilling Method: GEOPROBE	Location Sketch: GRID LOC G3
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft bgs., date) N/A	
Driller: E. SVEDABA (FAST TEK)	
Logged By: C. GORMAN	

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	~~Blow Count (per 6 inches)~~ TIME	Soil Boring GB47 Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
		Drive 0-2'		TOPSOIL/GRASS (~2-3")		NA	0
	Ø47	Rec. 2'	1Ø55	6" LAYER of ASH MATERIAL, roots grow into ASH. 0.75'			
	Ø48		11ØØ	SILT @ 0.75', dry, brown, ~20% clay, med. plasticity trace gravel (upto 0.5"), subround, trace sand.	ML		
2		Drive 2-6'		Clay content incr @ 2' to ~30% becomes sli. moist, incr. plasticity. (CLAYEY SILT)			
3	Ø49	Rec. 4'	11Ø5	Sand @ 2.5' (~20%) (SANDY CLAYEY SILT) color gradually becomes yellowish brown			
4				becomes SILTY SAND to SANDY SILT @ 4' trace iron oxide along rootlets, decayed), trace gravel	SM/ML		
6				TD = 6'			
0							

50

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

Boring Number: GB 48	Date Started/Completed: 7/26/00
Drilling Method: GEOPROBE	Location Sketch: GRID LOC G2
Outer Diameter of Boring: 2"	N↑
Inner Diameter of Well Casing: N/A	36 37 38 39
Depth to Water (ft. bgs., date) N/A	43 42 41 40
Driller: E. SVOBABA (FAST TEK)	44 45 46
Logged By: C. GORMAN	(48) 47

Soil Boring GB48

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	~~Blow Count (per 6 inches)~~ TIME	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
		Drive 0-2'		TOP SOIL + GRASS (3")			
	Ø5Ø	Rec	1115	ASH MATERIAL (6" thick) - collected in jar 0.75		N/A	0.0
1	Ø51	2'	1120	SILT @ 0.75', brown, dry, trace gravel (up to 0.5") very Stiff ~20% clay.	ML		
2							
3	Ø52	Drive 2-6' Rec 4'	1125	Sand content incr. @ 2.5' to ~10%. color changes (gradually) to yellowish brown, becomes sli. moist.			
4				Sand content incr w/ depth to ~30% @ 4', becomes med. loose. Clay content decr. to 10%. (gradational)	ML/SM		
5				Becomes SILTY SAND @ 5' (~40% silt, 50% sand, ~~40%~~ ~5% clay ~5% gravel)	SM		
6				TD=6'			
7							
8							
9							
10							

Sheet 1 of 1

CTO: 207
Bldg./Site: AOC #1
Project: NWS CONCORD

TETRA TECH EM INC. SOIL BORING AND WELL INSTALLATION LOG

Boring Number: GB49	Date Started/Completed: 7/26/02
Drilling Method: GEOPROBE	Location Sketch: GRID LOC G1
Outer Diameter of Boring: 2"	N
Inner Diameter of Well Casing: N/A	43 42 41 40
Depth to Water (ft. bgs., date) N/A	44 45 46
Driller: E. SUODOBA (FAST TEK)	49 48 47
Logged By: C. GORMAN	

Soil Boring GB49

Lithologic Description

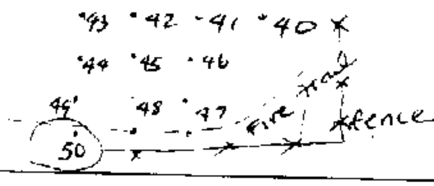
Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
		0-Drive 0-2' Rec 2'		3" to 4" of TOPSOIL + GRASS		N/A	0.0
	053		1130	ASH @ 0.5' to ~1.0' 1.0			
	054		1135	SILT @ 1.0', brown, dry, stiff, 10% clay, trace gravel	ML		
				clay content incr to ~20% @ 2.0'			
		Drive 2-6' Rec. 4'		becomes sl. moist @ 2.5'			
	055		1140	clay content incr. to ~30%. Sand content incr. to ~15%			
				TD=6'			
0							

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

Boring Number: GB 50	Date Started/Completed: 7/26/00
Drilling Method: GEOPROBE	Location Sketch: GRID LOC. #1 [ALONG FIRE TRAIL/ROAD]
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date) N/A	
Driller: E. SUIDABA (FAST TEK)	
Logged By: C. GORMAN	



Soil Boring GB50

Lithologic Description

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches) TIME	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–1	~~056~~	Drive 0-2' Rec. 2'	~~1445~~	~~For 3" = TOPSOIL~~ 0.5-1.5 ~~Sampled 0.5 to 1.0' likely~~ just topsoil material, ~~but possible ash w/in loose~~ topsoil/silt.	~~ML~~	N/A	0.0
1–2	~~057~~		~~1450~~	Along road - NO SAMPLE COLLECTED [DIRT FIRE TRAIL ROAD]			
2				@1.5' - SILT, dry, dark brown, loose, ~15% sand, trace gravel (up to 0.5"), ~10% clay	ML		
3		Drive 2-6' Rec. 4'		Clay content incr @ 3' to ~15%.			
4				Sand content incr. to ~15% @4' Color gradually changes to yellowish brown			
5							
6				TD=6' No visible signs of ash or other contaminant, No samples collected.			
7							
8							
9							
10							

TETRA TECH EM INC. **SOIL BORING AND WELL INSTALLATION LOG**

CTO: 267
Bldg./Site: Acc #1
Project: NWS Concord

Boring Number: GB 51	Date Started/Completed:
Drilling Method: GEOPROBE	Location Sketch: GRID LOC H2
Outer Diameter of Boring: 2"	N; 43, 40; 44; 49; 50, 51, 52
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date): N/A	
Driller: E. SIDDABA (FAST TEK)	
Logged By: C. GORMAN	

Soil Boring GB51

Lithologic Description

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	~~Blow Count (per 6 inches)~~	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
	N/A	Drive 0-2 Rec 2	0	1.0' = FIRE ROAD (DIRT ROAD) MATERIAL - no ASH observed. [PHOTOS (3) OF SLEEVE + MATERIAL @ 1.0'] 1.0	~~GL~~		0.0
			N/A	SILT, v. dark brown, stiff, ~30% clay, trace gravel, (up to c.5"), sli. plasticity. Sand content incr. with depth to ~30% @ 2.5' 3.0	ML	N/A	
	N/A	Drive 2-6' Rec 4'	N/A	becomes SILTY SAND @ 3.0 (yellowish brown, dry, med. loose) w/ ~15% clay, ~20% silt ~60% sand, ~5% gravel (med to fine) up to c.5", subround. Sli moist @ ~5'	Sm		
				TD=6'			

TETRA TECH EM INC. SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

Boring Number: GB 52	Date Started/Completed: 7/26/00
Drilling Method: GEOPROBE	Location Sketch: GRID LOC #3
Outer Diameter of Boring: 2"	N 34 · · 39
Inner Diameter of Well Casing: N/A	43 · · 40
Depth to Water (ft. bgs., date) N/A	47 · ·
Driller: E. SIZDABIT (FAST TEK)	49 ·
Logged By: C. GORMAN	50 51 52

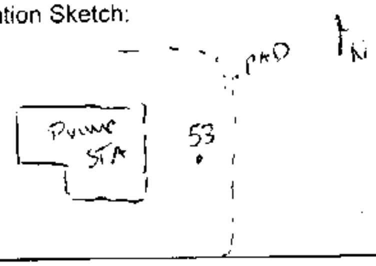
Soil Boring GB52

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
		Drive 0-2		SILT + Gravel (FIRE ROAD SURFACE) to ~ 0.75'			
1	056	Rec 2'	1215	@ ~0.5 to 1.0' - w/in Road material = v fine dust/ASH(?) distributed across 0.5' of road material. 1.0'			
	057		1220				
2				SILT, dark brown, sli moist, hard, ~10% sand, trace gravel	ML		
		Drive 2-6'		Sand content incr. @ 2.5 to ~20%			
3	~~058~~	Rec 4'		Stuff on inside of sleeve @ 3' - collect sample @ 3.5 to 4.0' instead			
4	058		1225	Sand content incr. w/ depth			
				gradational (4')			
				becomes SILTY SAND @ 4' (Clay ≅ 15%)	SM		
5							
6							
				TD = 6'			
7							
8							
9							
10							

TETRA TECH EM INC. — **SOIL BORING AND WELL INSTALLATION LOG**

CTO: 267
Bldg./Site: AOC #1
Project: NWS Concord

Boring Number: ~~GB 54~~ GB53	Date Started/Completed: 7/26/00
Drilling Method: GEOPROBE	Location Sketch:
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date) N/A	
Driller: E. SVODABIA (FAST TEK)	
Logged By: C. GORMAN	



Soil Boring GB53

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–4	N/A	Drive 0-4 Rec. 4'	N/A	Gravel + Silt (PAD MATERIAL) From surface to ~30% silt + clay w/ gravel, trace sand slightly moist, med loose	GM/ML	N/A	0.0
				Silt ~~content~~ content incr. w/ depth (to ~40% @ 4')			
4–8	N/A	Drive 4-8 Rec. 4'	N/A	BLACK CINDER @ 5.75' (3"-6" LAYER)	CINDER		0.0
				Coarse gravel @ 6.25 (large >2", subround clasts)			
				SILT, dark brown, sli moist, med stiff, trace gravel, ~25% clay, ~10% sand (med to fine.)	ML		
8–11	N/A	Drive 8-11 Rec 3'	N/A	Sand content incr @ ~8' to ~20%, color becomes yellowish brown			
				becomes SILTY SAND by ~10' (gradational contact)	SM		

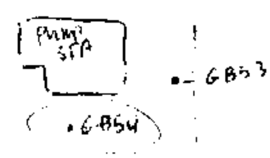
TD = 11'

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

CTO: 267
Bldg./Site: AOC # 1
Project: NWS CONCORD

Boring Number: ~~GB53~~ GB54	Date Started/Completed: 7/26/00
Drilling Method: GEOPROBE	Location Sketch: N
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date) N/A	
Driller: E-SUDDABA (FAST TEK)	
Logged By: C GERMAN	



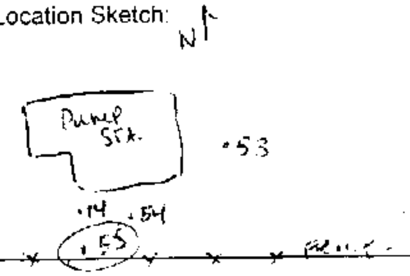
Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Soil Boring ___ Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–4	N/A	Drive 0-4 Rec 4'	N/A	Gravel @ Surface ~~Silty clay~~ GRAVEL (PAD MATERIAL) and Sand ~~silt~~ CLAYEY SILT	ML	N/A	0.0
4–8	N/A	Drive 4-8 Rec 4'		BLACK CINDER @ 4.75'	CINDER		
				SILT @ 5', dark brown, sl. moist, ~10% sand, trace gravel, ~10% clay sand content ↑ w/ depth.	ML		0.0
				SILTY SAND @ 7.5' (yellowish brown) (gradational 7.5')	~~SM/ML~~ SM		
8				TD = 8'			
9							
10							

Sheet 1 of

CTO: 267
Bldg./Site: AOC #1
Project: NWS CONCORD

TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

Boring Number: 6B55	Date Started/Completed: 7/26/00
Drilling Method: GEOPROBE	Location Sketch: 
Outer Diameter of Boring: 2"	
Inner Diameter of Well Casing: N/A	
Depth to Water (ft. bgs., date) N/A	
Driller: E. SVODABA	
Logged By: C. LOKMAN	

Soil Boring 6B55

Depth (ft) bgs	Sample Number	Drive Interval/ Recovered Interval	Blow Count (per 6 inches)	Lithologic Description	USCS Soil Symbol	Well Construction	OVM (ppm)
0–1		Drive 0-2 Rec 2		Soil + Grass @ surface (6" topsoil)		N/A	0
1				~0.75 - REDDISH CINDER MATERIAL (~4" thick - (concrete fragments)	ML / CINDER		
1–2				BROWN SILT @ 1.25 - dry to sli. moist, trace gravel, ~10% sand, ~10% clay	ML		
2–4		2-6 Rec 4'		Clay content incr. to ~15% @ 3'			
4–6		Drive 4-6 Rec 4'		Sand content incr. w/ depth to			
5				SILTY SAND @ 5' (yellowish brown)	SM		
6				TD = 6'			
8				~~TD = 8'~~			
9							
10							

S:\CLAS\Misc Administration\Forms\Soil Boring and Well Inst Log - Little.doc

APPENDIX B

CHAIN-OF-CUSTODY RECORDS

Tetra Tech EM Inc.
San Francisco Office

135 Main St. Suite 1800
San Francisco, CA 94105
415-543-4880
Fax 415-543-5480

Chain of Custody Record

	PO#	Lab: APCL
Project name: Sup. Sampling - Concord NWPS	TtEMI technical contact: Kevin Hoch	Field samplers: C. Gorman, M. Rash
Project number: G1069267 A0101	TtEMI project manager: Rik Lantz	Field samplers' signatures: [signature]

Sample ID	Sample Description/Notes	Date	Time	Matrix	40 ml VOA	1 Liter Amber	1 Liter Poly	Brass Tube	Glass Jar	[illegible]	CLP VOA	CLP SVOA	CLP Pest/PCBs	CLP Metals	TPH Purgeables	TPH Extractables	Herbicides
267A0CSS001	GB23, ~~[illegible]~~ 0-.5'	7/19/00	1045	soil						1		X	X	X			X
267A0CSS002	GB23, ~~[illegible]~~ .5'-1'		1050							1		O	O	O			O
267A0CSS003	GB23, 2-2.5'		1055							1		O	O	O			O
267A0CSS004	GB24 0-.5'		1105							1							
267A0CSS005	GB24 .5'-1'		1108							1							
267A0CSS006	GB24 2-2.5'		1110							1		O	O	O			O
267A0CSS007	GB25 0-.5' ~~5-1'~~		1130							1							
267A0CSS008	GB25 .5-1'		1135							1							
267A0CSS009	GB25 2-2.5'		1140							1							
267A0CSS010	GB27 .5-1', A1		1215							1							
267A0CSS011	GB29 ~~[illegible]~~ 0-.5', B1		1245							1							
267A0CSS012	GB29 .5-1', B2	↓	1250	↓						1		↓	↓	↓			↓

	Name (print)	Company Name	Date	Time
Relinquished by: [signature]	Marcie Rash	TtEMI	[illegible]	[illegible]
Received by:				
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

Turnaround time/remarks:
only ~~267A0CSS004~~ 267A0CSS001 gets analyzed full suite except VOCs
267A0CSS006 / 267A0CSS002 / " SS003 gets full suite analysis
" "

Tetra Tech EM Inc.
San Francisco Office

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San Francisco, CA 94105
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4133

Chain of Custody Record

Page 2 of 3/4

Project name: AOC supp sampling Concord NWPS	PO#	Lab: APCL
	TtEMI technical contact: Kevin Hoch	Field samplers: C. Garman M Rash
Project number: G0069 267 A0101	TtEMI project manager: Rik Lantz	Field samplers' signatures: Maria Rash

Sample ID	Sample Description/Notes	Date	Time	Matrix	40 ml VOA	1 Liter Amber	1 Liter Poly	Brass Tube	Glass Jar	Lidy sleeve	CLP VOA	CLP SVOA	CLP Pest/PCBs	CLP Metals	TPH Purgeables	TPH Extractables	Hexavalent
267A0CSS013	~~GB02~~ GB29, 2-2.5' B2	7.19.00	1300	soil						1		X	X	X			X
267A0CSS014	GB30, .75-1', B3	7.19.00	1310							1				O			
267A0CSS015	GB30, 1.5-2' B3		1312							1				O			
267A0CSS016	GB30, 2.5-3' B3		1315							1				O			
267A0CSS017	GB34 3-3.5 C2		1515							1							
267A0CSS018	GB34 3.5-4' C2		1517							1							
267A0CSS019	GB34 5.5-6 C2		1520							1							
267A0CSS020	GB35 .5-1' C1		1540							1							
267A0CSS021	~~B3~~ GB365 1-.5' C1		1545							1							
267A0CSS022	GB375, 5.5-6, C1		1550							1							
267A0CSS023	GB36 .5-1', D1		1600							1							
267A0CSS024	GB36, 1-1.5', D1		1602							1							

	Name (print)	Company Name	Date	Time
Relinquished by: Maria Rash	Maria Rash	TtEMI	7/19/00	1830
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Project name: Supp Sampling AIC Concord NWPS	TtEMI technical contact: Kevin Hock	Field samplers: M Rash, C Gorman
Project number: G0026 A0101	TtEMI project manager: Rik Lantz	Field samplers' signatures: Maxine Rash
PO#	Lab: APCL	

Sample ID	Sample Description/Notes	Date	Time	Matrix	40 ml VOA	1 Liter Amber	1 Liter Poly	Brass Tube	Glass Jar	1 Day 6" Sleeve	CLP VOA	CLP SVOA	CLP Pest/PCBs	CLP Metals	TPH Purgeables	TPH Extractables	Herbicides
267ADCSSD25	~~GB6~~ GB36, 3-3.5' D1	7.19.00	1605	Soil						1		X	X	X			X
267ADCSSD26	GB37, ~~[illegible]~~ 0.75-1.25' D2		1621							1							
267ADCSSD27	GB37, 1.25-1.75' D2		1623							1				O			
267ADCSSD28	GB37, 3.25-3.75' D2		1625							1				O			

MR

	Name (print)	Company Name	Date	Time
Relinquished by: Maxine Rash	Maxine Rash	TtEMI	[illegible]	1730
Received by:				
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PO#	Lab: APCI	
Project name: [illegible]	TtEMI technical contact: Kevin Hoch	Field samplers: C. Ehrman, M. Rash
Project number: ~~4000~~ 1100617267A0101	TtEMI project manager: Rik Lantz	Field samplers' signatures: Marcie Rash

Sample ID	Sample Description/Notes	Date	Time	Matrix	40 ml VOA	1 Liter Amber	1 Liter Poly	Brass Tube	Glass Jar	6" poly sleeve	CLP VOA	CLP SVOA	CLP Pest/PCBs	CLP Metals	TPH Purgeables	TPH Extractables	Herbicides
267ACSS029	GB39, .5-1', D4	7.19.00	11:48	Soil						1		X	X	X			X
267ACSS030	GB39, 1-.5', D4	↓	11:50	↓						1		↓	↓	↓			↓
267ACSS031	GB39, ~~3.5-4~~ 3-3.5', D4	↓	11:00	↓						1		↓	↓	↓			↓

Preservative Added

	Name (print)	Company Name	Date	Time
Relinquished by: Marcie Rash	Marcie Rash	TtEMI	7/19/00	1730
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Relinquished by:				
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Relinquished by:				
Received by:				

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Page 1 of ~~8~~ 7

Project name: AOC 1 Supp. Sampling Concord	PO#	Lab: APCL
Project number: G0009207A0101	TtEMI technical contact: Kevin Hoch	Field samplers: M. Rash, C. Gorman
	TtEMI project manager: Rik Lantz	Field samplers' signatures: Marcia Rash

Sample ID	Sample Description/Notes	Date	Time	Matrix	40 ml VOA	1 Liter Amber	1 Liter Poly	Brass Tube	Glass Jar	Encore	[illegible]	CLP VOA	CLP SVOA	CLP Pest/PCBs	CLP Metals	TPH Purgeables	TPH Extractables	Herbicides
207AOCSS032	GB42, .5-1' E2	7/26/00	0840	Soil					1	3		X	X	X	X			X
207AOCSS033	GB42, 1-1.5' E2		0845							3	1	O	O	O	O			O
207AOCSS034	GB42, 3-3.5' E2		0850							3	1	O	O	O	O			O
207AOCSS035	GB43, .25-.75' F1		0915						1	2		O			O			O
207AOCSS036	GB43, .75'-1.25' E1		0920							2	1	O			O			
207AOCSS037	GB43, 2.75'-3.25' E1		0925							2	1	O			O			
207AOCSS038	GB44, .25-.5' F1		1010						1	2		O			O			
207AOCSS039	GB44, .5-1' F1		1015							2	1	O			O			
207AOCSS040	GB44, 2.75-3.25' F1		1020							2	1	O			O			
207AOCSS041	GB45, .25-1' F2		1025						1	2		O			O			
207AOCSS042	GB45, 1.5-2' F2		1030							2	1	O			O			
207AOCSS043	GB45, 3.5-4' F2		1035							2	1	O			O			

	Name (print)	Company Name	Date	Time
Relinquished by: Marcia Rash	Marcia Rash	TtEMI	7.26.00	1930
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Project name: AOCI Supp. Sampling-Concord	PO#	Lab: APCL
Project number: G0069267A0101	TtEMI technical contact: Kevin Hack	Field samplers: M. Rash, C. Gorman
	TtEMI project manager: Ric Clark	Field samplers' signatures: Marcie Rash

Sample ID	Sample Description/Notes	Date	Time	Matrix	40 ml VOA	1 Liter Amber	1 Liter Poly	Brass Tube	Glass Jar	Encore	Poly 6" Slit	CLP VOA	CLP SVOA	CLP Pest/PCBs	CLP Metals	TPH Purgeables	TPH Extractables	Herbicides
267AOCSS044	GB46, .25-.75', F3	7/26/10	1040	Soil					1	2		O	O	O	O			X
267AOCSS045	GB46 .75-1.25' F3		1045							2	1	O	O	O	O			O
267AOCSS046	GB46 2.75'-3.25' F3		1050							2	1	O	O	O	O			O
267AOCSS047	~~GB07~~ GB47, .25-.75' G3		1055						1	2		O			O			
267AOCSS048	GB47, .75-1.25' G3		1100							2	1	O			O			
267AOCSS049	GB47, 2.75-3.25' G3		1105							2	1	O			O			
267AOCSS050	GB48, .25-.75' G2		1115						1	2		O	O	O	O			O
267AOCSS051	GB48, .75-1.25' G2		1120							2	1	O	O	O	O			O
267AOCSS052	GB48, 2.75-3.25', G2		1125							2	1	O	O	O	O			O
267AOCSS053	GB49, 0-1' G1		1130						1	2		O			O			O
267AOCSS054	GB49, 1-1.5' G1		1135							2	1	O			O			
267AOCSS055	GB49, 3-3.5' G1		1140							2	1	O			O			

	Name (print)	Company Name	Date	Time
Relinquished by: Marcie Rash	Marcie Rash	TtEMI	7.26.10	1930
Received by:				
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Project name: AC1267A0101 (Act upp. sampling Concord)	PO#: Kevin Hoch	Lab: APCL / M Rash	
Project number:	TtEMI technical contact: Rik Lantz	Field samplers: Rash / Truman	
	TtEMI project manager:	Field samplers' signatures: M Marcelle Rash	

Sample ID	Sample Description/Notes	Date	Time	Matrix	40 ml VOA	1 Liter Amber	1 Liter Poly	Brass Tube	Glass Jar	Encore	60 poly sleeve	CLP VOA	CLP SVOA	CLP Pest/PCBs	CLP Metals	TPH Purgeables	TPH Extractables	Herbicides
267A0CSS056	GB5052, .5-1.0', H3	7.26.00	1215	soil					1	2		⊗	X	X	⊗			X
267A0CSS057	GB5052 1-1.5', H3		1220							2	1	O			O			
267A0CSS058	GB5052 3.5-4', H3		1225							2	1	O			O			
267A0CSS004A	GB24, 0-.5'		1300						1	2	1		X	X	O			O
005A	GB24, 1-1.5'		1305								1	⊗	O	O	O			⊗
006A	GB25, 0-.5'		1320						1				X	X	X			X
007A	GB25, .75-1.25'		1325							2	1	X	X	X	X			X
008A	GB25, 3-3.5'		1330							2	1	X	X	X	X			X
~~267A0CSS001~~	~~GB23, 0-.5~~		~~1340~~							2		X						
267A0CSS002	.5-1.0', GB23		1345							2		X						
267A0CSS003	GB23, 2-2.5'		1350							2		X						
267A0CSS059	GB26, .5-1', B1		1435							2		X	X	X	X			X

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Project name: ACCI-Supp. Sampling Concord	PO#	Lab: APCL
Project number: G1069267A0101	TtEMI technical contact: Kevin Hoch	Field samplers: C. Gorman, M. Rash
	TtEMI project manager: Rik Lantz	Field samplers' signatures: Marcie Rash

Sample ID	Sample Description/Notes	Date	Time	Matrix	40 ml VOA	1 Liter Amber	1 Liter Poly	Brass Tube	Glass Jar	EnCore	6" poly sleeve	CLP VOA	CLP SVOA	CLP Pest/PCBs	CLP Metals	TPH Purgeables	TPH Extractables	Herbicides
267AOCSS0060	GB28, 1-1.5', B1	7-26-00	1400	soil						2	1	X	X	X	X			X
267AOCSS0061	GB28, 3-3.5', B1		1405							2	1	X	X	X	X			X
267AOCSS0012A	GB29, .75-1.25', B2		1415							2	1	X	X	X	X			X
267AOCSS0013A	GB29, 2.75-3.25', B2		1420							2	1	X	X	X	X			X
267AOCSS0014A	GB30, 0.5-1', B3		1540							2		X						
267AOCSS0015	GB30, 1.5-2', B3		1545							2		X						
267AOCSS0011A	GB29, 0.5', B2		1410						1				X	X	X			X
267AOCSS0010A	GB27, 1-1.5', A1		1430						1	2		X	X	X	X			X
267AOCSS0062	GB27, 1.5-2', A1		1435							2	1	X	X	X	X			X
267AOCSS0063	GB27, 2-2.5', A1		1440						1	2		X	X	X	X			X
267AOCSS0064	GB27, 3.5-4.0, A1		1445						1	2		X	X	X	X			X
267AOCSS0067	GB26, 4.25-4.75', A2	2	1425							2	1	X	X	X	X			X

	Name (print)	Company Name	Date	Time
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PO#	Lab: APCL	
Project name: AA SI/PP Sampling Concord	TtEMI technical contact: Kevin Hoch	Field samplers: M Rash, C. Gorman
Project number: G0069.267A.0101	TtEMI project manager: Rik Lantz	Field samplers' signatures: Marcie Rash

Sample ID	Sample Description/Notes	Date	Time	Matrix	40 ml VOA	1 Liter Amber	1 Liter Poly	Brass Tube	Glass Jar	EnCore	Sleeve		CLP VOA	CLP SVOA	CLP Pest/PCBs	CLP Metals	TPH Purgeables	TPH Extractables	[illegible]
267ACCSS465	GB26, 1.5-2', A2	7-26-00	1215	Soil					1	2			X	X	X	X			X
267ACCSS466	GB26, 2.25-2.75', A2		1520										X	X	X	X			X
267ACCSS468	GB30, 2.5-3'		1555						1	2			X	X	X	X			X
267ACCSS469	GB32, .5-1.0', C4		1630						1	2			X	X	X	X			X
267ACCSS470	GB32, 1.0-1.5', C4		1635							2	1		X	X	X	X			X
267ACCSS471	GB33, .5-1.0, C3		1640						1	2			X	X	X	X			X
267ACCSS428	GB37, 3.25-3.75, D2		1650							2			X						
267ACCSS426A	GB37, .75-1.25, D2		1645						1	2			X	X	X	X			X
267ACCSS475	GB38, .5-1, D3		1730						1	2			X	X	X	X			X
267ACCSS476	GB38, 1-1.5, D3		1735							2	1		X	X	X	X			X
267ACCSS477	GB38, 3-3.5, D3		1740							2	1		X	X	X	X			X
267ACCSS478A	GB?A, .5-1, C2		1705										X	X	X	X			X

	Name (print)	Company Name	Date	Time
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Project name: ACC Supp. Sampling Concord	PO#	Lab: APCL		
Project number: 9006926 7A0101	TtEMI technical contact: Kevin Hoch	Field samplers: M.Rash, C.Govina		
	TtEMI project manager: Rik Lantz	Field samplers' signatures: [signature]		

Sample ID	Sample Description/Notes	Date	Time	Matrix	40 ml VOA	1 Liter Amber	1 Liter Poly	Brass Tube	Glass Jar	EnCore	6" Sleeve	CLP VOA	CLP SVOA	CLP Pest/PCBs	CLP Metals	TPH Purgeables	TPH Extractables	[illegible]
267ACCSSL19A	GB34, 3-3.5 C2	7.26.00	1710	Soil						2	1	⊗	x	x	⊗			x
267ACCSSL73	GB33, 3-3.5, C3		1650							2	1	⊗	⊗	⊗	⊗			⊗
267ACCSSL72	GB33, 1-1.5, C3		1645							2	1	⊗	⊗	⊗	⊗			⊗
267ACCSSL17A	GB34 .25-.5, C2		1700						1	2		⊗	x	x	⊗			x
267ACCSSL23A	GB36, .5-1, D1		1630						1	2		⊗	x	x	⊗			x
267ACCSSL20A	GB35, .5-1, C1		1615						1	2		⊗	⊗	⊗	⊗			⊗
267ACCSSL25A	GB36, 3-3.5, D1		1640							2		⊗						
267ACCSSL24A	GB36, 1-1.5 D1		1625							2	1	⊗	x	x	⊗			x
267ACCSSL30A	GB39, 1-1.5 D4		1750							2	1	⊗	x	x	⊗			x
267ACCSSL31	GB39, 3-3.5 D4		1735							2		⊗						
267ACCSSL29A	GB39, .5-1' D4		1745						1	2		⊗	x	x	⊗			x
267ACCSSL21A	GB35, 1-1.5, C1	↓	1600	↓						2	1	⊗	⊗	⊗	⊗			⊗

	Name (print)	Company Name	Date	Time
Relinquished by: [signature]	Marcie Rash	TtEMI	7.26.00	1930
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	PO#	Lab: APCL
Project name: AOC 1 SGP Cummins Circle	TtEMI technical contact: Kevin Hock	Field samplers: C. Gorman, M. Rash
Project number: 9000267A0101	TtEMI project manager: Rik Lantz	Field samplers' signatures: Marcie Rash

Sample ID	Sample Description/Notes	Date	Time	Matrix	40 ml VOA	1 Liter Amber	1 Liter Poly	Brass Tube	Glass Jar	Encore	Sleeve	CLP VOA	CLP SVOA	CLP Pest/PCBs	CLP Metals	TPH Purgeables	TPH Extractables	[illegible]
267AOCSS4-74	GB35, 1.5-2, CI	7.26.00	1022	Soil						2	1	X	X	X	X			X
267AOCSS4-22A	GB35 3.5-4, CI	"	1025	"						2	1	X	X	X	X			X
267AOCTR78	equip. rinsate	"	1830	Water	3	4	1					X	X	X	X			X
267AOCTB079	Trip blank	"	1840	Water	3							X						

Preservative Added

	Name (print)	Company Name	Date	Time
Relinquished by: Marcie Rash	Marcie Rash	TtEMI	7.26.00	1930
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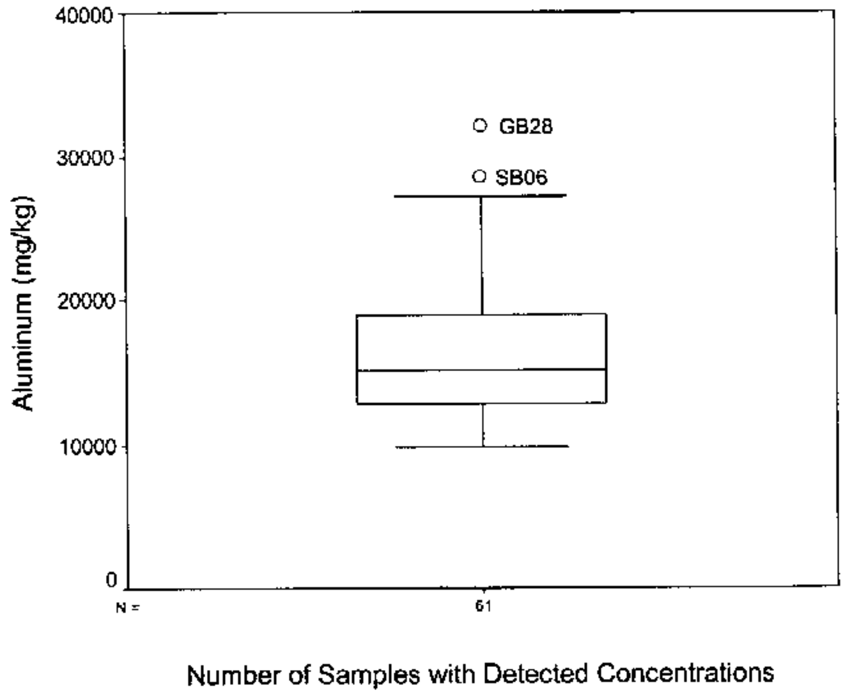
APPENDIX C

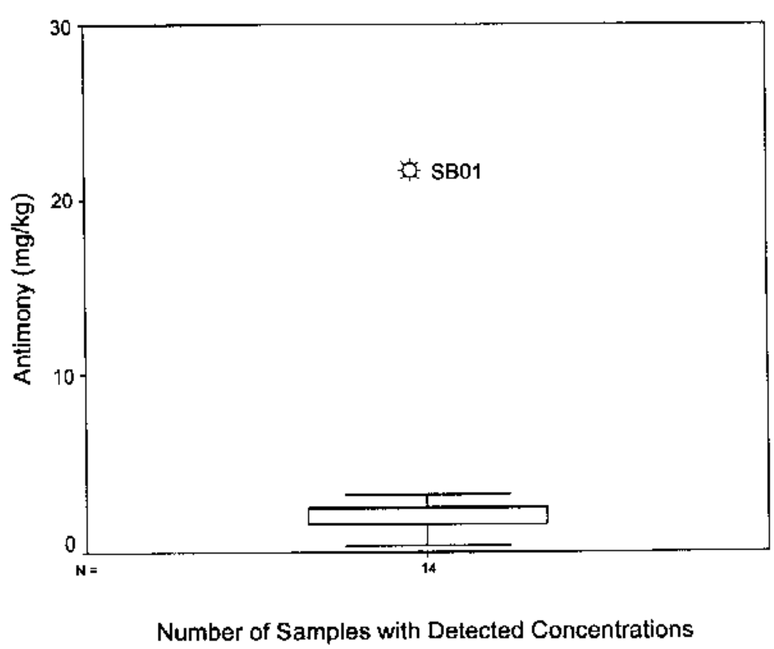
BOX PLOTS SHOWING DISTRIBUTION OF CHEMICALS OF POTENTIAL ECOLOGICAL CONCERN IN SOIL

FIGURE C-1
ALUMINUM CONCENTRATIONS IN SOIL SAMPLES



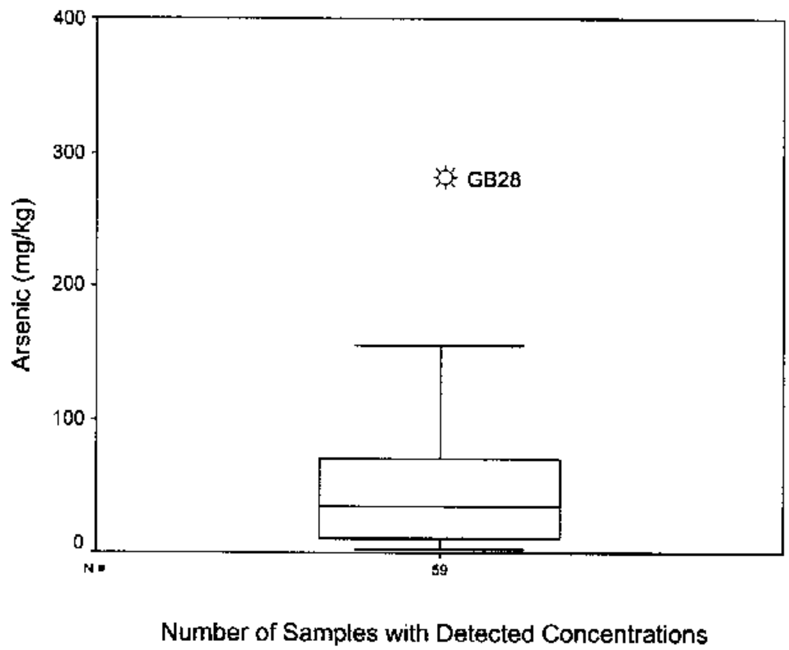
Note: The following sampling IDs identified on the box plot are listed in order from high to low concentration: GB28 (32,700 mg/kg) and SB06 (28,600 mg/kg).

FIGURE C-2
ANTIMONY CONCENTRATIONS IN SOIL SAMPLES



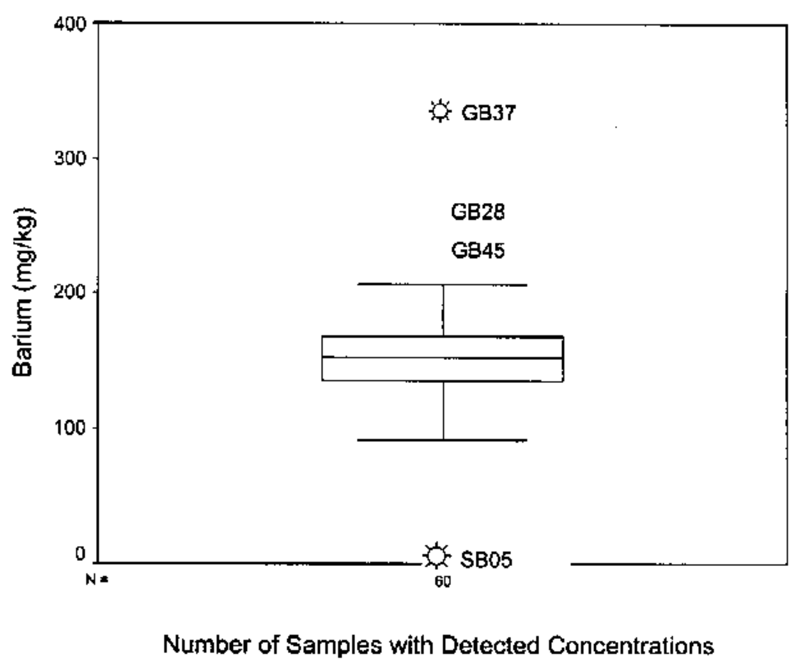
Note: The sampling ID identified on the box plot is SB01 (21.6 mg/kg).

FIGURE C-3
ARSENIC CONCENTRATIONS IN SOIL SAMPLES



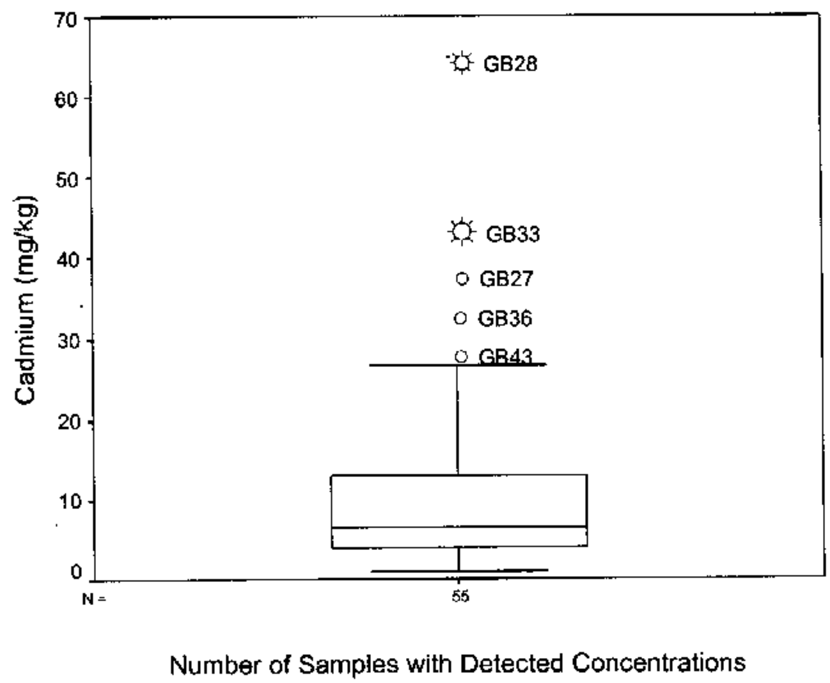
Note: The sampling ID identified on the box plot is GB28 (287 mg/kg).

FIGURE C-4
BARIUM CONCENTRATIONS IN SOIL SAMPLES



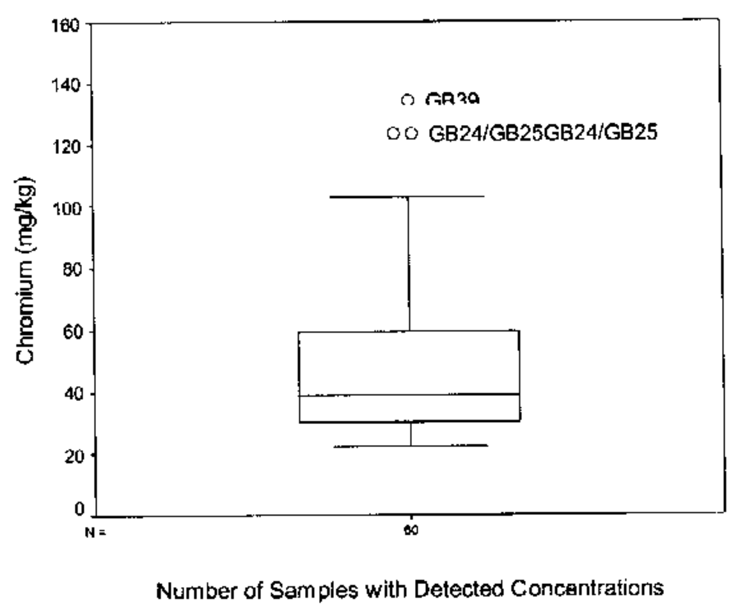
Note: The following sampling IDs identified on the box plot are listed in order from high to low concentration: GB37 (338 mg/kg), GB28 (250 mg/kg), GB45 (225 mg/kg), and SB05 15.1 mg/kg).

FIGURE C-5
CADMIUM CONCENTRATIONS IN SOIL SAMPLES



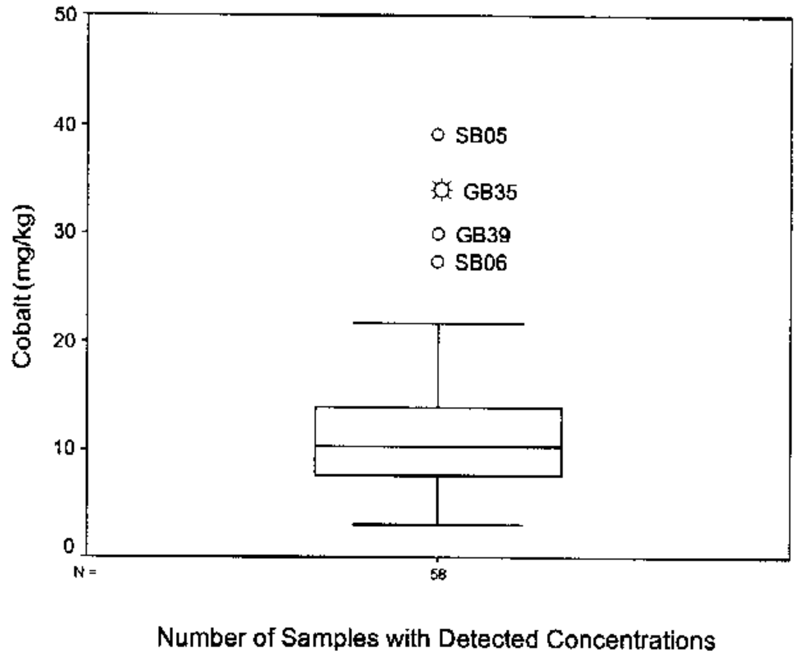
Note: The following sampling IDs identified on the box plot are listed in order from high to low concentration: GB28 (64.9 mg/kg), GB33 (42.6 mg/kg), GB27 (36.8 mg/kg), GB36 (31.4 mg/kg), and GB43 (29.2 mg/kg).

FIGURE C-6
CHROMIUM CONCENTRATIONS IN SOIL SAMPLES



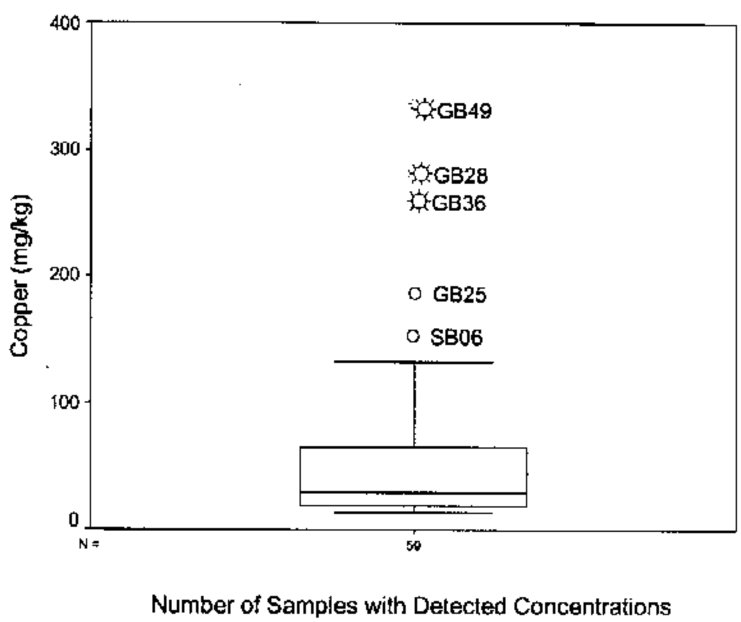
Note: The following sampling IDs identified on the box plot are listed in order from high to low concentration: GB39 (138 mg/kg), GB24 (125 mg/kg), and GB25 (124 mg/kg).

FIGURE C-7
COBALT CONCENTRATIONS IN SOIL SAMPLES



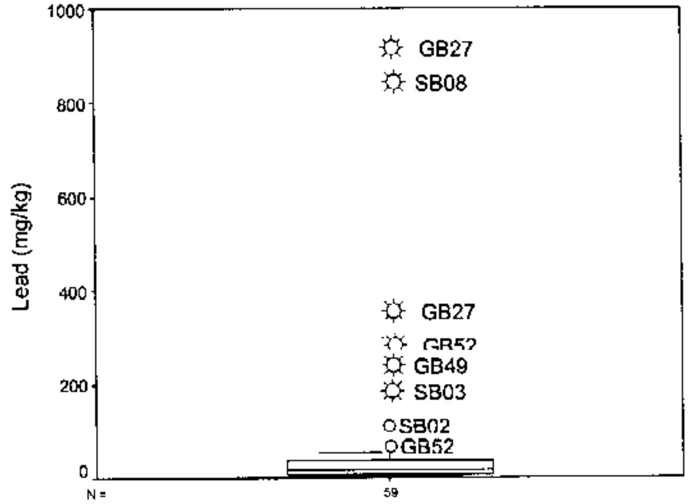
Note: The following sampling IDs identified on the box plot are listed in order from high to low concentration: SB05 (38.9 mg/kg), GB35 (36.3 mg/kg), GB39 (30 mg/kg), and SB06 (27.6 mg/kg).

FIGURE C-8
COPPER CONCENTRATIONS IN SOIL SAMPLES



Note: The following sampling IDs identified on the box plot are listed in order from high to low concentration: GB49 (336 mg/kg), GB28 (283 mg/kg), GB36 (278 mg/kg), GB25 (193 mg/kg), and SB06 (156 mg/kg).

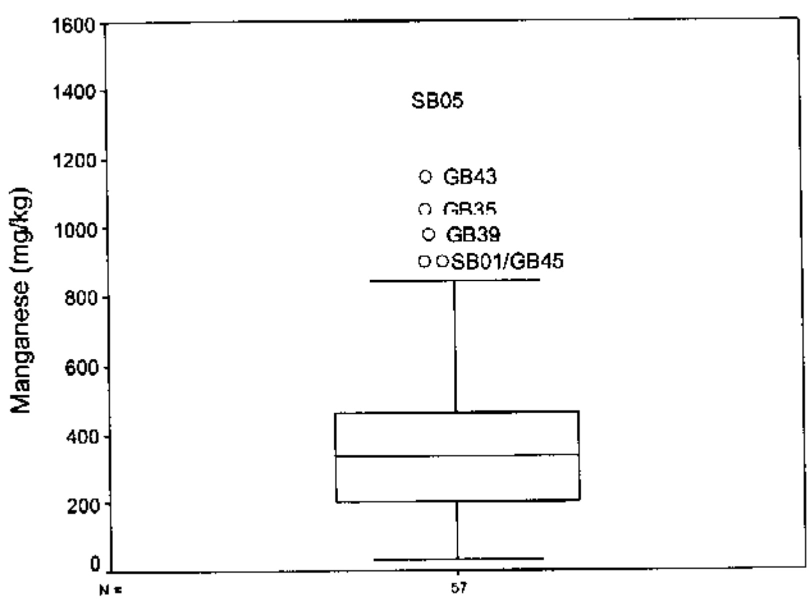
FIGURE C-9
LEAD CONCENTRATIONS IN SOIL SAMPLES



Number of Samples with Detected Concentrations

Note: The following sampling IDs identified on the box plot are listed in order from high to low concentration: SB01 (11,400 mg/kg, not shown), SB02 (4,300 mg/kg, not shown), GB27 (933 mg/kg), SB08 (895 mg/kg), GB27 (354 mg/kg), GB52 (299 mg/kg), GB49 (273 mg/kg), SB03 (170 mg/kg), SB02 (114 mg/kg), and GB52 (98.8 mg/kg).

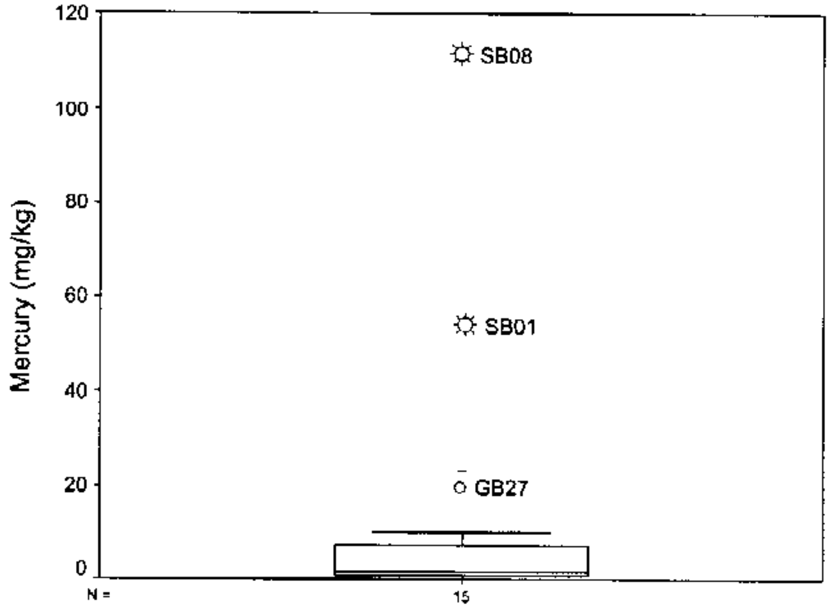
FIGURE C-10
MANGANESE CONCENTRATIONS IN SOIL SAMPLES



Number of Samples with Detected Concentrations

Note: The following sampling IDs identified on the box plot are listed in order from high to low concentration: SB05 (1,360 mg/kg), GB43 (1,130 mg/kg), GB35 (1,000 mg/kg), SB09 (1,000 mg/kg), GB39 (943 mg/kg), SB01 (896 mg/kg), and GB45 (886 mg/kg).

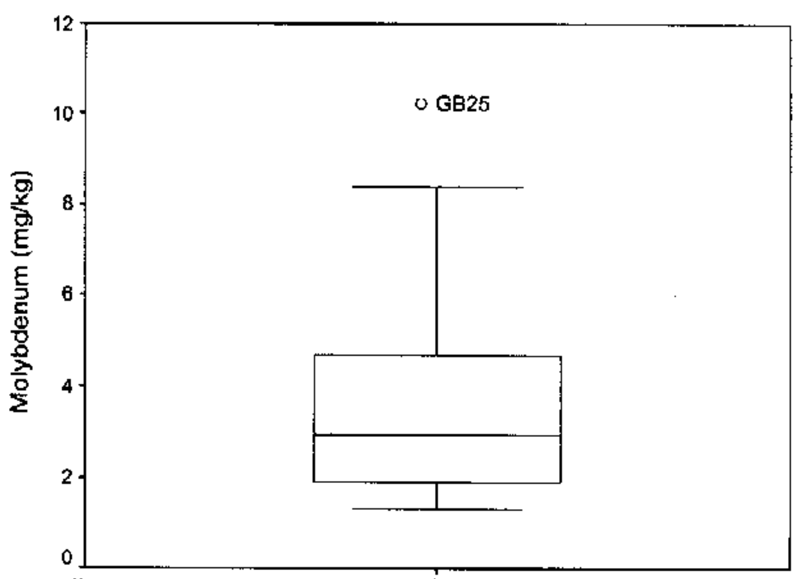
FIGURE C-11
MERCURY CONCENTRATIONS IN SOIL SAMPLES



Number of Samples with Detected Concentrations

Note: The following sampling IDs identified on the box plot are listed in order from high to low concentration: SB08 (113 mg/kg), SB01 (54.8 mg/kg), and GB27 (21.4 mg/kg).

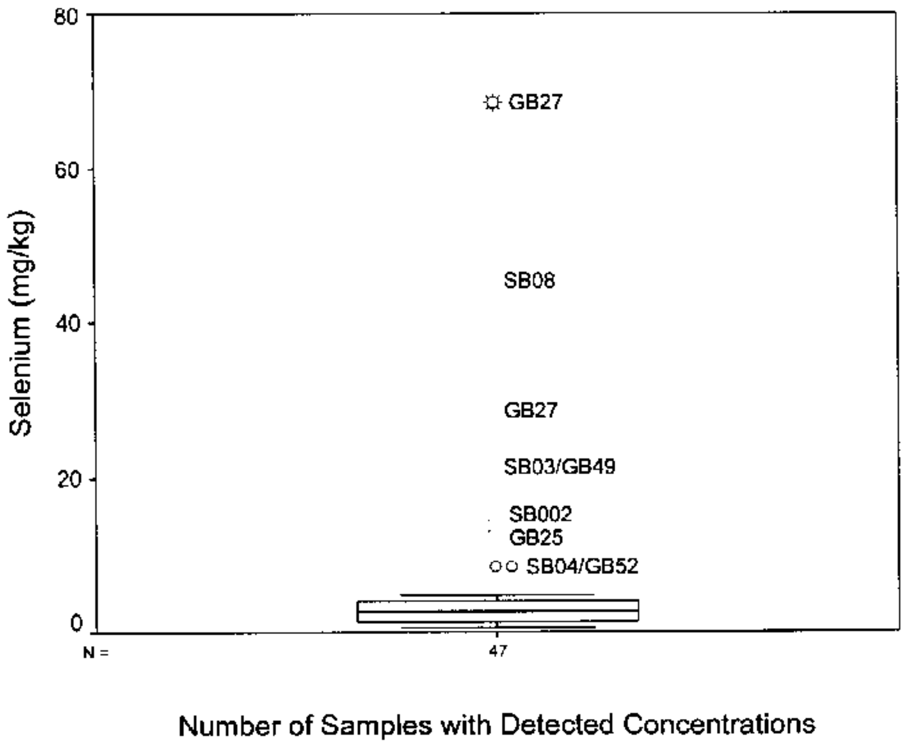
FIGURE C-12
MOLYBDENUM CONCENTRATIONS IN SOIL SAMPLES



Number of Samples with Detected Concentrations

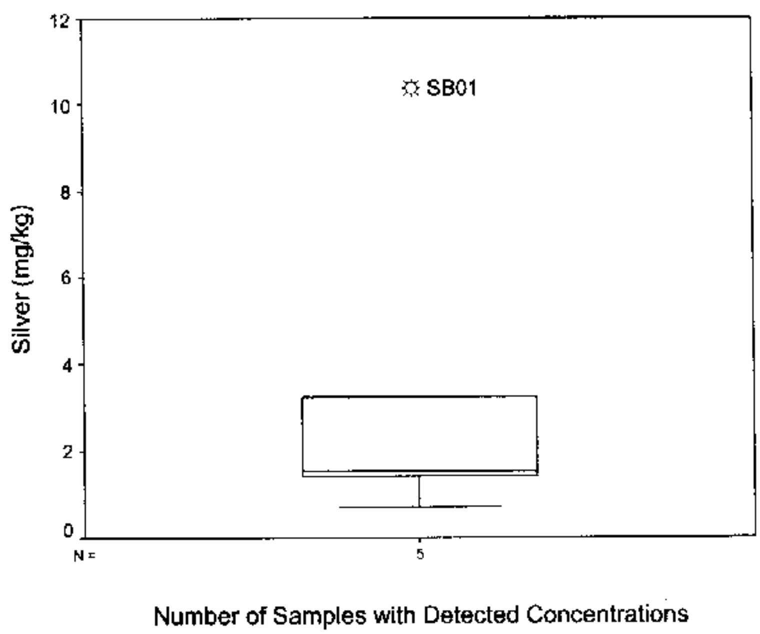
Note: The sampling ID identified on the box plot is GB25 (10.4 mg/kg).

FIGURE C-13
SELENIUM CONCENTRATIONS IN SOIL SAMPLES



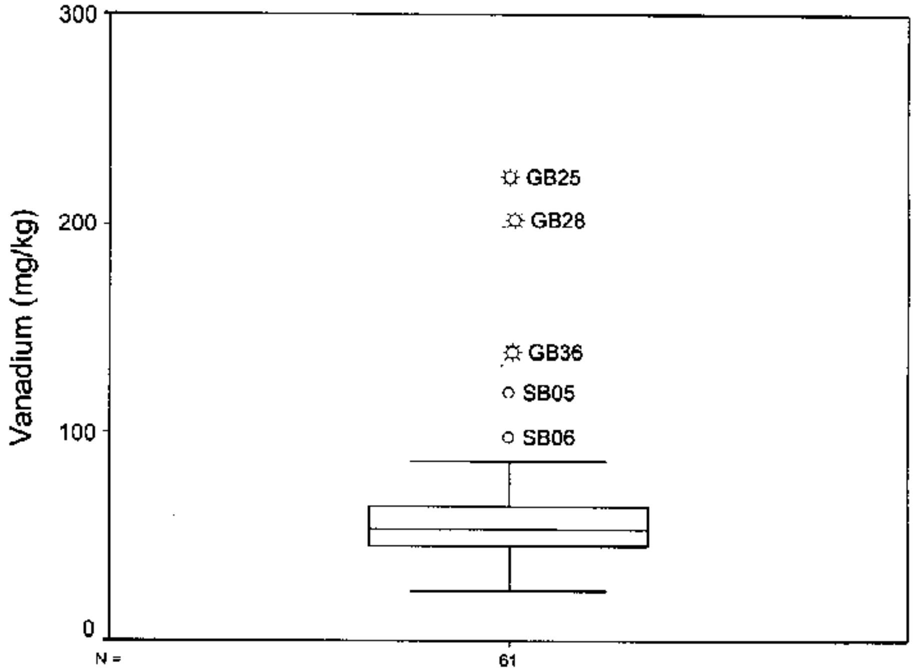
Note: The following sampling IDs identified on the box plot are listed in order from high to low concentration: SB01 (875 mg/kg, not shown), SB02 (215 mg/kg, not shown), GB27 (68.3 mg/kg), SB08 (44.7 mg/kg), GB27 (27.3 mg/kg), SB03 (20.5 mg/kg), GB49 (20.5 mg/kg), SB02 (14.4 mg/kg), GB25 (12.9 mg/kg), SB04 (9.3 mg/kg) and GB52 (9.1 mg/kg).

FIGURE C-14
SILVER CONCENTRATIONS IN SOIL SAMPLES



Note: The sampling ID identified on the box plot is SB01 (10.4 mg/kg).

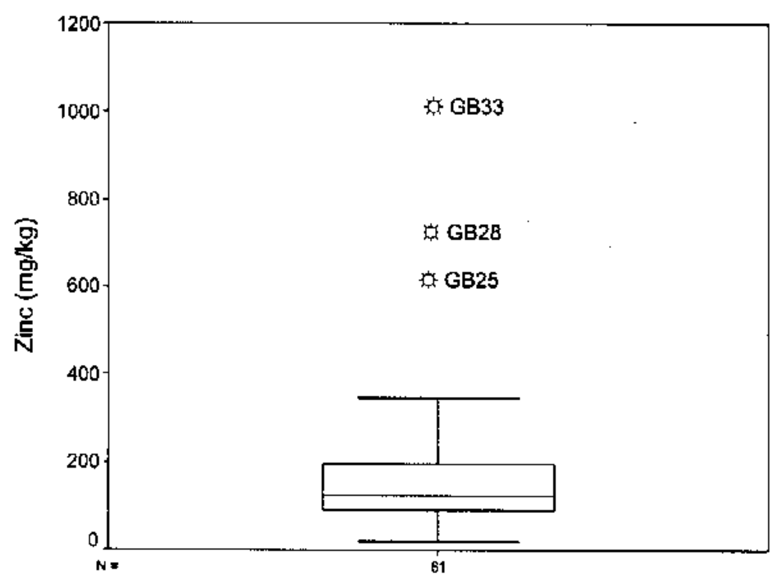
FIGURE C-15
VANADIUM CONCENTRATIONS IN SOIL SAMPLES



Number of Samples with Detected Concentrations

Note: The following sampling IDs identified on the box plot are listed in order from high to low concentration: GB25 (220 mg/kg), GB28 (199 mg/kg), GB36 (132 mg/kg), SB05 (118 mg/kg), and SB06 (94.8 mg/kg.

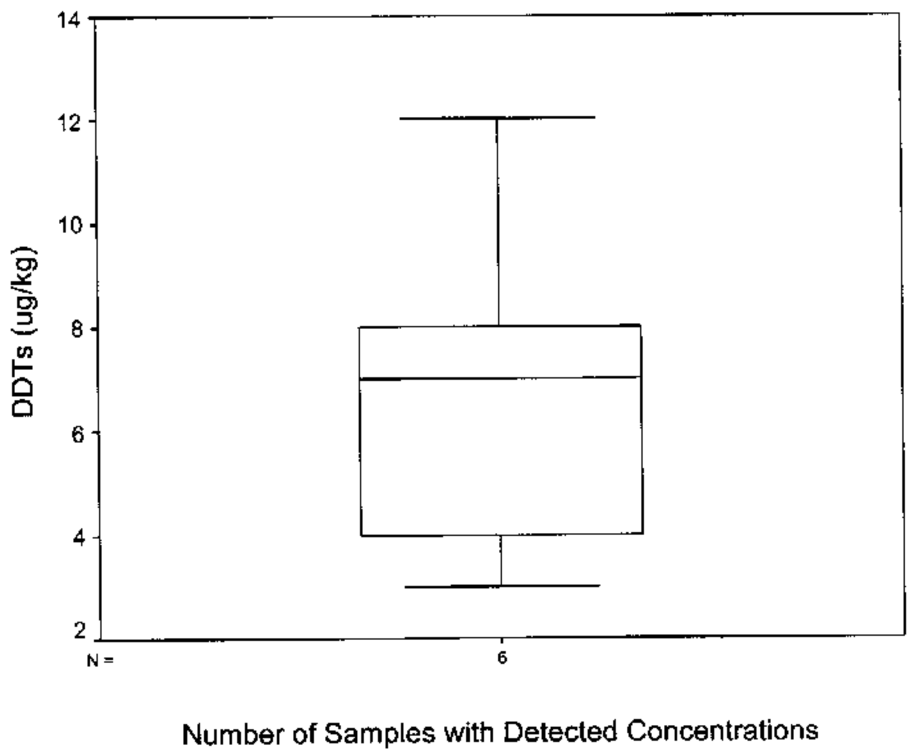
FIGURE C-16
ZINC CONCENTRATIONS IN SOIL SAMPLES



Number of Samples with Detected Concentrations

Note: The following sampling IDs identified on the box plot are listed in order from high to low concentration: GB33 (1,010 mg/kg), GB28 (700 mg/kg), and GB25 (628 mg/kg).

FIGURE C-17
DDT CONCENTRATIONS IN SOIL SAMPLES



APPENDIX D

METHODS AND PARAMETERS USED IN FOOD-CHAIN MODELING CALCULATIONS

Risk to birds and mammals was evaluated by selecting assessment endpoints identified in Section 7.0 and evaluating exposure to chemicals at AOC 1 through ingestion of chemicals in soil and prey. Risks to representative birds and mammals at AOC 1 were evaluated quantitatively by comparing estimated doses with toxicity reference values (TRV) from peer-reviewed literature studies to derive hazard quotients (HQ) that reflect the risk posed by ingested contaminants. A TRV is a daily dose level derived from reported biological effects on laboratory animals. Risk to representative birds and mammals at AOC1 was evaluated quantitatively based on a HQ approach.

TRVs were derived for COPECs and receptors specific to Navy installations in a collaborative effort involving the Navy and its contractors and the EPA Region IX Biological Technical Advisory Group (BTAG). The BTAG includes federal, state, and local regulatory agencies and resource trustees. The derivation of TRVs and the use of food-chain analysis in the HQ approach were described in detail in a technical memorandum (EFA West 1998).

Food-chain analysis was conducted for seven inorganic COPECs (arsenic, cadmium, copper, lead, mercury, selenium, and zinc). Ingestion of contaminants in soil and prey was considered the most important exposure pathway for vertebrate receptors. The contribution of surface water to the total daily dose was considered negligible, and was not included in the calculations, as allowed by EPA (1997).

Representative vertebrate receptors at AOC 1 are the Western Meadowlark, Northern Harrier, and gray fox. Selection of these species was based on the assessment endpoints identified in Table 7.

Section 7.0 discusses the exposure assessment to birds and mammals, including site-specific doses calculated using food-chain models. Section 7.1 presents the screening-level ecological risk assessment (SLERA), including HQs calculated for each receptor. Section 7.2 presents a more focused assessment, and summarizes the results of the evaluation of risk to birds and mammals.

D.1 FOOD-CHAIN MODELING METHODS

Food-chain modeling integrates ecological information, such as life history and feeding behavior of receptors, and spatial variation in chemical concentrations in prey and soil into the risk assessment Estimates of site-specific exposures for birds and mammals were based on daily dose estimates modeled from measurements of chemical concentrations in soil and food sources (Pascoe and others 1994, 1996; Pastorok and others 1996).

Site-specific doses were calculated as the sum of the daily dietary exposure estimates for ingestion of food items and incidentally ingested soil. The following equation was adapted for each receptor:

$$Dose_{total} = \frac{\left(\left[IR_{prey} \times C_{prey}\right] + \left[IR_{soil} \times C_{soil}\right]\right) \times SUF}{BW} \tag{6-1}$$

Where:

$Dose_{total}$	=	Estimated dose from ingestion (mg/kg body weight per day)
IR_{prey}	=	Ingestion rate of prey (kilograms per day [kg/day])
C_{prey}	=	Concentration of chemical in prey (mg/kg)
IR_{soil}	=	Ingestion rate of soil (kg/day)
C_{soil}	=	Concentration of chemical in soil (mg/kg)
SUF	=	Site use factor (unitless), which is a ratio of site-specific area to receptor's foraging range (unitless)
BW	=	Body weight (kg) of receptor

Exposure assumptions were tailored to conditions at AOC1 to reduce uncertainty. Nevertheless, sources of uncertainty may result from assumptions concerning bioavailability, diet proportions of receptors, food-chain transfer, and other biological and physical factors and processes influencing exposure and toxicity at the site. Estimates of dose used values from relevant literature based on habitat, taxa, exposure route, and other ecological factors. Uncertainty is discussed in Section 7.3

Chemical concentrations in prey were converted from wet weight to dry weight to be consistent with TRVs as follows:

Dry weight concentration = (wet weight concentration)/(1-proportion of water in media)

D.1.1 Exposure Parameters Used in Dose Calculations

Exposure models for vertebrates are based on the assumption that exposure to chemicals is primarily through ingestion of prey and through incidental ingestion of sediment and soil during grooming, feeding, or burrowing activities (Beyer and others 1994). Exposure models estimate the mass of a chemical ingested daily by a receptor per kilogram of body weight (daily chemical dosage). Estimates of exposure are based on knowledge of the spatial and temporal distribution of chemicals and receptors and on specific natural and life history characteristics that influence exposure to chemicals. Site-specific data on chemical concentrations in soil and prey are used in conjunction with available literature values for other parameters to estimate daily dose.

All doses calculated in the SLERA were based on a typical receptor and incorporated these parameters:

- The *average* adult body weight found in the literature.
- The *average* ingestion rate found in the literature or an average ingestion rate calculated using the appropriate equation from Nagy and others (1999) based on the *average* adult body weight found in the literature.
- An estimate of SUF based on literature

The selection of chemical concentrations in soil and tissue used in the food-chain model is shown in the table below.

Parameter	Type	Units	Reference/Notes
All Receptors			
Ingestion $Rate_{prey}$	Average adult	kg/day	Literature value; if no literature ingestion rate value was available, calculated with body weight using the Nagy and others (1999) metabolic rate equation.
Ingestion $Rate_{soil}$	Average adult	kg/day	Literature-based rate.
SUF	Average adult	unitless	Based on literature-derived foraging range information.
Body Weight	Average adult	kg	Body weights from the literature.

SLERA			
Prey Concentration	Maximum	mg/kg	RASS 4 site-collected plant and rodent tissue for arsenic, cadmium, copper, lead, mercury (rodent only), selenium, and zinc. For all other chemicals, tissue concentrations were derived from bioaccumulation factors from EPA (1999a) multiplied by the maximum soil concentration.
Soil Concentration	Maximum	mg/kg	Site-collected soil. ½ DL substituted for non-detects.

Focused Assessment (only for chemicals where HQ > 1.0 in SLERA)			
Prey Concentration	UCL_{95}	mg/kg	RASS 4 site-collected plant and rodent tissue for arsenic, cadmium, copper, lead, mercury (rodent only), selenium, and zinc. For all other chemicals, tissue concentrations were derived from bioaccumulation factors from EPA (1999a) multiplied by the UCL_{95} soil concentration.
Soil Concentration	UCL_{95}	mg/kg	Site-collected soil. ½ DL substituted for non-detects.

Notes:

½ DL ½ Detection limit
EPA Environmental Protection Agency
kg/day kilograms per day
mg/kg Milligrams per kilogram
UCL_{95} 95th percentile of the upper confidence level of mean
RASS Remedial action subsite

No site-collected tissue was available for organic chemicals and some metals; in these cases, literature-derived BAFs (Sample and others 1996; EPA 1998; EPA 1999a) were multiplied by soil concentration to estimate tissue concentrations. The uncertainty associated with using literature-derived tissue concentrations is discussed in Section 7.3.

To evaluate risk to vertebrate receptors, a two-step approach to dose modeling was used: (1) SLERA and (2) focused assessment. In the SLERA, daily doses calculated based on maximum soil and tissue concentrations were compared to high and low TRVs. Any dose that exceeded the high TRV was carried through to the focused assessment. In the focused assessment, doses calculated using the UCL_{95} soil and tissue concentrations were compared to the high TRV. Using this method, HQs greater than 1.0 indicate significant and immediate risk.

For chemicals that were not detected, one half the detection limit was substituted in the dose for all receptors.

D.1.2 Dose Parameters used for Representative Receptors

Numerical values and rationale for the selection of parameters in the dose model are presented in the following sections for each representative receptor. The dose parameters for each receptor are explained below.

D.1.2.1 Dose Parameters for the Western Meadowlark

The Western Meadowlark (*Sturnella neglecta*) was selected to represent passerine birds. Following is a summary of the parameters used in dose calculations for the Western Meadowlark.

Parameter	Average Adult	Units	Reference/Notes
Ingestion $Rate_{prey}$	0.0238	kg/day	Calculated with body weight from Dunning (1993) using the Nagy and others (1999) metabolic rate equation for passerines (a=10.5; b=0.681), and the food requirement conversion for herbivores (10.0 kJ/g)
Prey Composition	37 (plant) 63 (invertebrate)	percent	Diet composed of 63 percent animal matter (mostly insects, spiders, sowbugs, and snails) and 37 percent grass and forb seeds and grains (Bryant 1914, as cited in Zeiner and others 1990b).
Prey Concentrations	Maximum and UCL_{95}	mg/kg	Upland plant tissue data collected from RASS 4 (arsenic, cadmium, copper, lead, selenium, and zinc). For all other chemicals, tissue concentrations were derived from bioaccumulation factors for plants (37 percent) and invertebrates (63 percent) from EPA (1999a) multiplied by the appropriate soil concentration
Tissue Moisture	8.5 (plant) 84 (worm)	percent	Average of mature dry grasses tissue moisture and earthworm tissue from EPA (1993)
Ingestion $Rate_{soil}$	0.0031	kg/day	Based on ingestion rate of Savannah sparrows from Williams (1987)
Soil Concentrations	Maximum and UCL_{95}	mg/kg	Soil collected from site
Foraging Range	3 to 32	acres	Territories in Wisconsin and Iowa from Kendeigh (1941) and Lanyon (1956), both cited in Zeiner and others (1990b)
SUF	1.0 (SLERA and focused assessment)	unitless	Based on foraging range information
Body Weight	0.0977	kg	Average calculated from Dunning (1993)

Notes:

UCL_{95}	95th percentile upper confidence limit of the mean
kg/day	Kilograms per day
kJ/g	Kilojoules per gram
mg/kg	Milligrams per kilogram
SUF	Site use factor

D.1.2.2 Dose Parameters for the Northern Harrier

The Northern Harrier (*Circus cyaneus*) was selected to represent carnivorous raptors. The Northern Harrier is a year-round resident of NWSSBD Concord (PRC 1996) and a California species of special concern. Following is a summary of the parameters used in dose calculations for the Northern Harrier.

Parameter	Average Adult	Units	Reference/Notes
Ingestion $Rate_{prey}$	0.0369	kg/day	Calculated with body weight from Hamerstrom and others (1985) and Dunning (1993) using the Nagy and others (1999) metabolic rate equation for all birds (a=10.5; b=0.681), and the food requirement conversion for insectivorous birds (18.0 kJ/g)
Prey Composition	100 (rodent)	percent	Diet composed mainly of rodents, but may also include birds, frogs, small reptiles, crustaceans, and insects (Brown and Amadon 1968; Temeles 1989). Harriers were assumed to consume only soft tissues of their prey.
Prey Concentrations	Maximum and UCL_{95}	mg/kg	Rodent tissue data (sum of kidney and liver) collected from RASS 4 (arsenic, cadmium, copper, lead, mercury, selenium, and zinc). For all other chemicals, tissue concentrations were derived from bioaccumulation factors for herbivorous deer mouse from EPA (1999a) multiplied by the appropriate soil concentration
Tissue Moisture	68	percent	Mouse tissue moisture from EPA (1993)
Ingestion $Rate_{soil}$	0.00026	kg/day	0.7 percent of ingestion rate; rate for Bald Eagle in Pascoe and others (1996)
Soil Concentrations	Maximum and UCL_{95}	mg/kg	Soil collected from site
Foraging Range	30 to 640	acres	Daily foraging area in Michigan from Craighead and Craighead (1956), as cited in Zeiner (1990b)
	1-5.5	miles	Daily distance to foraging areas from communal roost in Michigan, from Craighead and Craighead (1956), as cited in Zeiner (1990b)
SUF	1.0 (SLERA) 0.57 (focused assessment)	unitless	Based on foraging range information Craighead and Craighead (1956), as cited in Zeiner and others (1990a), found the daily foraging area ranged from 30 to 640 acres. Since the area of AOC1 is approximately 17 acres, a SUF of 0.57 (17 acres/30 acres) was used for the focused assessment.
Body Weight	0.441	kg	Average of males and females from Dunning (1993)

Notes:

UCL_{95} 95 percent upper confidence limit of the mean

Notes (continued):

kg/day	Kilogram per day
kJ/g	Kilojoule per gram
mg/kg	Milligram per kilogram
SUF	Site use factor

D.1.2.3 Dose Parameters for the Gray Fox

The gray fox (*Urocyon cinereoargenteus*) was selected to represent carnivorous mammals at AOC1. Following is a summary of the parameters used in dose calculations for the gray fox.

Parameter	Average Adult	Units	Reference/Notes
Ingestion $Rate_{prey}$	0.177	kg/day	Calculated with body weight from Silva and Downing (1995) using the Nagy and others (1999) metabolic rate equation for eutherian mammals (a=4.21; b=0.772), and the food requirement conversion for omnivores (14.0 kJ/g)
Prey Composition	100 (rodent)	percent	Diet composed mainly of mice and voles, but may also include other small mammals, insects, game birds, poultry, and occasionally seeds, berries, and fruits (Palmer and Fowler 1975, as cited in EPA 1993; Hockman and Chapman 1983). Foxes were assumed to ingest their prey whole.
Prey Concentrations	Maximum and UCL_{95}	mg/kg	Rodent tissue data (sum of kidney, liver, and femur) collected from RASS 4 (arsenic, cadmium, copper, lead, mercury, selenium, and zinc). For all other chemicals, tissue concentrations were derived from bioaccumulation factors for herbivorous deer mouse from EPA (1999)
Tissue Moisture	68	percent	Mouse tissue moisture from EPA (1993)
Ingestion $Rate_{soil}$	0.00496	kg/day	2.8 percent of ingestion rate; rate for red fox in Beyer and others (1994)
Soil Concentrations	Maximum and UCL_{95}	mg/kg	Soil collected from site
Foraging range	32 to 1,900	acres	Home ranges in Wisconsin and Florida from Trapp and Hallberg (1975), as cited in Zeiner (1990a)
	320	acres	Female average home range near Davis, California, based on Fuller (1978), as cited in Zeiner (1990a)

Parameter	Average Adult	Units	Reference/Notes
SUF	1.0 (SLERA) 0.05 (focused assessment)	unitless	Based on foraging range information Fuller (1978), as cited in Zeiner and others (1990b), found the female average home range was 320 acres. Since the area of AOC1 is approximately 17 acres, a SUF of 0.05 (17 acres/320 acres) was used for the focused assessment.
Body Weight	3.88	kg	Average of male and female gray fox body weights from Silva and Downing (1995)

Notes:

UCL_{95}	95 percent upper confidence limit of the mean
kg/day	Kilogram per day
kJ/g	Kilojoule per gram
mg/kg	Milligram per kilogram
SUF	Site use factor

D.1.3 Hazard Quotient Interpretation

Site-specific daily dose estimates were compared to high and low TRVs to estimate the potential adverse biological effects on each receptor. Based on this comparison, the risk to representative receptors was characterized; this comparison was performed in a manner consistent with EPA's HQ methodology (EPA 1989b) as follows:

$$HQ = \frac{Dose}{TRV}$$

where:

HQ = Hazard quotient (unitless)

Dose = Chemical-, receptor-, and site-specific daily dose estimate (mg/kg-day)

TRV = Chemical- and receptor-specific toxicity reference value (mg/kg-day)

D.1.4 Toxicity Reference Values

All TRVs used in the ERA were derived from the Navy-BTAG working group (EFA West 1998). Each TRV represents a critical exposure level from a toxicological study and is supported by a data set of toxicological exposures and effects. A low TRV is a conservative value consistent with a chronic no effect level. A high TRV represents a mid-range of lowest observed adverse effects level (LOAEL) for a given chemical, where the endpoint of toxicity was ecologically relevant. TRVs were derived separately for birds and mammals using available toxicological literature.

General TRVs derived for mammals and birds were adjusted for each site-specific receptor of concern based on body scaling (allometric conversion). The underlying assumption of allometric conversion is that physiological functions, such as metabolic rates, are a function of body size (Opresko and others 1993). Allometric conversions assume that smaller animals have higher metabolic rates and are typically able to detoxify or eliminate ingested chemicals more quickly than larger animals (Opresko and others 1993; Sample and others 1996). The following allometric conversion equations by Sample and Arenal (1999) were used for this food-chain model:

For birds: $\text{Dose}_{\text{receptor}} = \text{Dose}_{\text{test organism}}\ (\text{Body Weight}_{\text{test organism}}/\text{Body Weight}_{\text{receptor}})^{(1\text{-}1.2)}$

For mammals: $\text{Dose}_{\text{receptor}} = \text{Dose}_{\text{test organism}}\ (\text{Body Weight}_{\text{test organism}}/\text{Body Weight}_{\text{receptor}})^{(1\text{-}0.94)}$

TRVs for each chemical, allometrically converted for each of the representative receptors, are presented in a TRV technical memorandum (EFA WEST 1998).

D.2 HAZARD QUOTIENT APPROACH

Risk to the receptors was characterized by calculating an HQ from the dose and a literature-derived TRV (HQ = dose/TRV). For the SLERA, the dose estimate was divided by a high TRV and a low TRV, resulting in two HQs for each chemical-receptor pair that span the range of possible risks identified by this method (EFA WEST 1998). For the focused assessment, the dose was divided only by the high TRV. As explained in EPA regulatory guidance (EPA 1989b), the HQ approach indicates that receptors may be at risk if the HQ exceeds 1.0. Because of differences in the degree of conservatism in selection of TRVs for various chemicals and receptors, resulting HQ values should not be compared between chemicals or receptors; instead they should be considered individually.

Doses were calculated for all receptors using average values for exposure parameters such as body weight and ingestion rate. The use of soil and prey concentrations is described in Section D.1.1. The worst-case scenario is represented by the case in which the HQ calculated using the dose and the high TRV ($HQ_{\text{Dose/high TRV}}$) is greater than 1.0. In the worst-case scenario, the receptor may be at significant and immediate risk from that chemical, if all assumptions of the model are correct. The high TRV represents the low to mid-range of doses that caused observable effects in laboratory animals.

The minimal risk scenario is represented by the situation in which the HQ calculated using the dose and the low TRV ($HQ_{dose/low\ TRV}$) is less than or equal to 1.0. A $HQ_{(dose/low\ TRV)}$ less than 1.0 indicates no risk from exposure of that receptor to that chemical. Low TRVs represent a concentration at which no adverse effects were observed in laboratory animals.

Risk posed by site-specific dose estimates that range between the low and high TRVs cannot be easily characterized. In those cases, the risk to the receptor was evaluated in the context of the toxicological literature that the TRV is based on.

Risk characterization based on food chain analysis and literature reviews is presented in Section 7.0 for selected birds and mammals. Using site-specific prey tissue concentrations, this type of food-chain analysis provides a relatively good estimate of dose for those receptors and chemicals for which data are available. The complete dose calculations for the SLERA are provided in Tables 13 through 15. The complete dose calculations for the focused assessment are provided in Tables 19 through 21.

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TABLE 1

ANALYTICAL RESULTS FOR 1999 PRELIMINARY ASSESSMENT INVESTIGATION

PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Sampling Location	SB01	SB01	SB01	SB02	SB02	SB03	SB03	SB04	SB04	SB04	SB05	SB06	SB06	SB06	SB07	SB08	SB09	Equip. Blank	Background Concentration [2]	PRG [3] (Indust. Soils)
Previous ID	AOC 1	AOC 1	AOC 1	AOC 2	AOC 3	AOC 3	AOC 3	AOC 4	AOC 4	AOC 4	AOC 5	AOC 6	AOC 6	AOC 6	AOC 7	AOC 8	AOC 9			
(depth, ft below grade)	(0.7 - 1.0)	(1.0 - 1.5)	(2.0 - 2.5)	(0.25 - 0.5)	(0.0 - 0.5)	(1.0 - 1.5)	(3.0 - 3.5)	(0.5 - 1.0)	(1.0 - 1.5)	(2.5 - 3.0)	(0.25 - 0.5)	(0.25 - 0.75)	(0.75 - 1.25)	(2.75 - 3.25)	(3.5 - 4.0)	(0.0 - 0.5)	(4.5 - 5.0)			
Soil Type	cinders	clayey silt	clayey silt	weathered pavement	gray silt (gypsum?)	silty clay	silty clay	gray silt (gypsum?)	silty clay	silty clay	gravel road base	gravel raod base	silty clay	sandy clay	silty clay	silty clay (ash?)	silty clay w/ silt			
Sample Number	SB001	SB002	SB003	SB004	SB006	SB007	SB008	SB014	SB015	SB016	SB005	SB010	SB011	SB012	SB013	SB009	SB018	SW017		
Metals (mg/kg)																				
Aluminum	14,700	13,700	10,900	15,400	349	20,400	29,100	1,160	16,400	33,900	26,900	28,600	15,100	17,600	24,700	22,900	18,300	17.8	20,000	1,900,000
Antimony	21.6	--	--	2.3	2.5	--	--	3.2	2.4	--	--	--	--	--	--	--	--	--	1.2	750
Arsenic	55.3	5.4	4.8	22.4	--	31.6	6.2	11.8	148	8.7	4	2.8	6.4	5.7	12.1	28.6	12.6	1.6	7.3	3.0
Barium	168	151	117	129	91.7	146	199	113	63	213	15.1 J	--	152	302	185	206	149	--	210	120,000
Beryllium	--	--	--	--	0.046 J	--	0.34 J	--	--	--	--	--	--	--		--	--	--	0.56	3,700
Cadmium	2.7	--	--	1.2	8	8.4	--	3.7	11.3	--	--	--	--	--	3.2	3.7	--	--	0.15	930
Calcium	26,100	2,080	2,250	8,220	268,000	29,200	3,300	313,000	43,800	4,290	12,800	17,900	2,550	16,900	33,900	13,300	31,300	94.9	NA	NA
Chromium	36.3 J	28.1 J	27.5 J	36.9 J	28.4 J	37.9 J	48.1 J	78 J	86.2 J	55.4 J	40 J	37.1 J	34.1 J	27.1 J	77.2 J	46.3 J	39.6	--	55	450
Cobalt	10.4 J	20.6	16.7	9.7 J	--	10.5 J	10.4 J	--	10.8 J	14.5	38.9	27.6	16.7	12.4	8.3 J	8.9 J	13.2	--	24	29,000
Copper	61.4 J	17.8 J	11 J	38.1 J	--	42.5 J	14 J	--	88.7 J	14.1 J	133 J	156 J	16.6 J	12.6 J	29.9 J	27.4 J	15.1	1.8	64	70,000
Iron	21,400	15,400	14,200	21,200	190	21,900	29,100	603	15,300	32,000	45,000	38,700	19,900	20,400	24,100	20,100	19,400	4.6	NA	560,000
Lead	11,400	39.5	20.3	4,300	114	170	9.4	47.2	29.7	8.4	18.1	1.9	8	6.7	19	895	9.8	--	18	1,000
Magnesium	4,690	1,930	1,850	4,470	60.7 J	3,430	4,680	43.3 J	988 J	5,220	16,100	17,300	2,540	5,700	3,840	2,290	4,850	35.7	NA	NA
Manganese	407 J	896 J	622 J	264 J	--	322 J	493 J	-	407 J	554 J	1,360 J	695 J	712 J	734 J	243 J	200 J	1,000	--	870	45,000
Mercury	54.8	--	--	2.8	--	3.5	--	0.1 J	--	--	1.2	1.1	--	--	--	113	0.094 J	0.32	0.14	560
Molybdenum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	DL	9,400
Nickel	32.1 J	21.4 J	16.2 J	30.7 J	-	26.3 J	36.3 J	--	18.3 J	56.9 J	31.4 J	26.9 J	28.2 J	45.8 J	21.9 J	27.8 J	44.5	--	86	37,000
Potassium	986 J	799 J	485 J	994 J	139 J	1,520	929 J	217 J	1,920	1,130 J	907 J	711 J	955 J	901 J	1,840	1,640	1,110	70.1	NA	NA
Selenium	875 J	3.3 J	1.2 J	215 J	14.4 J	20.5 J	--	2.6 J	9.3 J	--	0.85 J	--	--	--	4.2 J	44.7 J	--	--	DL	9,400
Silver	10.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	DL	9,400
Sodium	619	--	--	392 J	--	265 J	308 J	--	361 J	--	--	--	--	--	--	--	711 J	--	NA	NA
Thallium	--	--	--	--	1.4	--	--	12	--	--	--	--	--	0.58	--	--	--	2.5	DL	130
Vanadium	52.5	43.2	46	52.4	7 J	56	65.6	25.8	36.3	73.3	118	94.8	54.1	46.5	125	62.1	47.1	--	86	13,000
Zinc	106	59.2	18.7	92.8	20.7	194	42.6	51.2	92	51.3	90.1	52.2	38.4	37.1	174	131	55.8	1.4	83	560,000
Volatile Organic Compounds (mg/kg)																				
Acetone	95 J	60 J	240 J	NA	240 J	--	78 J	-	NA	NA	NA	NA	NA	NA	--	NA	--	12		6,100,000
Toluene	--	--	--	NA	--	1	--	5 J	NA	NA	NA	NA	NA	NA	--	NA	--	--		2,000,000
Semivolatile Organic Compounds (mg/kg)																				
None detected	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
Pesticides/PCBs																				
None detected	--	--	--	NA	--	--	--	--	NA	NA	NA	NA	NA	NA	--	NA	--	--		--
Herbicides																				
None detected	--	--	--	NA	--	--	--	--	NA	NA	NA	NA	NA	NA	--	NA	--	--		--
Other Analyses																				
Percent Moisture (%)	9.9	13.8	15	4.4	37.8	14.5	17.4	36.4	20.3	18.9	9.1	6.9	12.1	13.3	22.3	25.8	17.2	--		--
pH	6.44	4.15	5.16	5.09	5.51	4.95	4.73	5.36	3.84	6.18	6.23	6.24	5.46	6.38	3.61	4.56	6.61	--		--

Notes:

-- = not detected

J = estimated concentration

NA = not analyzed / not applicable

DL = detection limit

mg/kg = micrograms per kilogram

mg/kg = milligrams per kilogram

[1] Sampling locations have been renamed from names assigned in original PA report (TtEMI 1999).

[2] Background concentrations from "Technical Memorandum: Estimation of Background Metal Concentrations in the Inland Area Soils" (PRC 1996)

[3] If carcinogenic and noncarcinogenic PRGs exist, the lower value is listed in this table.

TABLE 2

ANALYTICAL RESULTS FOR EASTERN HALF OF AREA OF CONCERN 1
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Point ID	GB26	GB26	GB26	GB27	GB27	GB27	GB27
Sample Depth (in feet)	1.5 - 2	2.25 - 2.75	4.25 - 4.75	1 - 1.5	1.5 - 2	2 - 2.5	3.5 - 4
Material	waste	soil	soil/waste	waste	soil	waste	soil
Metals (mg/kg)							
Aluminum	17,600	21,200	18,700	14,900	16,700	8,760	21,700
Antimony	--	1.3 J	0.94 J	2.9	2.2 J	1.6 J	3.5
Arsenic	50.4	92.8	47.3	70.1	110	47.8	56.1
Barium	190	124	126	119	148	98	135
Beryllium	--	--	--	--	--	--	--
Cadmium	4.3	81.8	37.1	17.9	36.8	10.6	30.1
Calcium	26,200	45,700	56,800	68,400	38,800	198,000	66,700
Chromium	44.8	101	69.2	62.2	76.2	53.2	84.1
Cobalt	13.9	5.7 J	6.6 J	4.9 J	5.5 J	3.3 J	6.9 J
Copper	27.2	323	90.8	110	129	53.2	95.2
Iron	24,800	16,700	14,700	17,800	17,300	7,800	13,300
Lead	11.2	158	29.3	933	354	117	80.9
Magnesium	6,930	1,660	2,120	1,390	1,360	1,010 J	1,260 J
Manganese	498	173	191	116	157	83.9	242
Mercury	--	3.4	--	21.4	9.8	2.8	--
Molybdenum	--	6.4	4.9	2.9	4.2 J	3	3.4
Nickel	55.1 J	16.0 J	18	14.6	16.0 J	10.6 J	14.9
Potassium	1,520 J	2,400 J	2,550 J	1,740 J	1,850 J	1,180 J	4,040 J
Selenium	--	30.4	3.8	68.3	27.3 J	17.3	12.3
Silver	--	--	--	1.5 J	--	0.81 J	--
Sodium	--	--	--	--	--	--	--
Thallium	--	--	--	--	--	--	--
Vanadium	51.2	192	65.6	61.3	76.8	37.4	79.6
Zinc	94.6	649	322	250	345	143	316
Volatile Organic Compounds (mg/kg)							
4-methyl-2-pentanone	--	--	--	--	--	--	--
Toluene	--	--	--	--	--	--	--
Semivolatile Organic Compounds (mg/kg)							
Benzo(a)anthracene	NA	NA	NA	76 J	--	NA	--
Benzo(a)pyrene	NA	NA	NA	54 J	--	NA	--
Benzo(b)fluoranthene	NA	NA	NA	87 J	--	NA	--
Benzo(k)fluoranthene	NA	NA	NA	48 J	--	NA	--
Chrysene	NA	NA	NA	86 J	--	NA	--
Fluoranthene	NA	NA	NA	130 J	43 J	NA	--
Phenanthrene	NA	NA	NA	77 J	--	NA	--
Phenol	NA	NA	NA	--	--	NA	--
Pyrene	NA	NA	NA	100 J	390	NA	430
Total PAHS	NA	NA	NA	660	43	NA	--
Pesticides (in mg/kg)							
4,4'-DDE	NA	NA	NA	2 J	--	NA	--
4,4'-DDT	NA	NA	NA	12 J	6 J	NA	6 J
Aldrin	NA	NA	NA	--	--	NA	3
Alpha-Chlordane	NA	NA	NA	--	--	NA	--
Aroclor-1248	NA	NA	NA	--	--	NA	49 J
Aroclor-1254	NA	NA	NA	--	--	NA	--
Dieldrin	NA	NA	NA	4 J	--	NA	9 J
Gamma-chlordane	NA	NA	NA	--	1 J	NA	3
Miscellaneous							
% moisture	8.1	20.4	20.1	8.7	15	49.5	23.2
pH	NA	NA	4.12	5.12	4.32	4.97	4.42

TABLE 2

ANALYTICAL RESULTS FOR EASTERN HALF OF AREA OF CONCERN 1
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Point ID	GB28	GB28	GB28	GB29	GB29	GB29
Sample Depth (in feet)	0.5 - 1	1 - 1.5	3 - 3.5	0 - 0.5	0.75 - 1.25	2.75 - 3.25
Material	soil/waste	soil	soil	waste	soil	soil
Metals (mg/kg)						
Aluminum	32,700	12,100	21,600	14,500	14,500	14,700
Antimony	1.5 J	--	0.36 J	0.78 J	--	--
Arsenic	287	139	100	48.7	86	4.7 J
Barium	250	126	185	110	131	132
Beryllium	--	--	--	--	--	--
Cadmium	64.9	9.9	3.1	9.2	17.3	--
Calcium	49,900	2,930	4,720	70,500	13,400	2,310
Chromium	103	26.9	42.3	72.1	30.8	24.1
Cobalt	12.3 J	10.1 J	11.6 J	3.8 J	7.7 J	7.3 J
Copper	283	18.5	26.8	78.3	50.1	12.1 J
Iron	27,700	15,300	23,700	11,800	15,300	19,600
Lead	45.9 J	7.6	8.1	18.7	17.7	4.8 J
Magnesium	2,320	1,740	5,860	844 J	1,280	4,310
Manganese	450	300	309	106	253	726
Mercury	--	--	--	--	--	--
Molybdenum	1.9 J	--	--	2.1	--	--
Nickel	36.7	27.7	56.9	10.2 J	17.5	36.7 J
Potassium	3,140 J	869 J	1,510 J	1,500 J	1,260 J	1,020 J
Selenium	3.4 J	0.42 J	0.41 J	3.3	1.5	--
Silver	--	--	--	--	--	--
Sodium	--	--	--	--	--	--
Thallium	--	--	--	--	--	--
Vanadium	199	42.1	69.4	62.5	54.9	44.5
Zinc	700	127	76	97.3	204	34.1 J
Volatile Organic Compo						
4-methyl-2-pentanone	--	--	--	NA	--	--
Toluene	2 J	--	--	NA	--	--
Semivolatile Organic Co						
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA
Total PAHS	NA	NA	NA	NA	NA	NA
Pesticides (in mg/kg)						
4,4'-DDE	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA
Aldrin	NA	NA	NA	NA	NA	NA
Alpha-Chlordane	NA	NA	NA	NA	NA	NA
Aroclor-1248	NA	NA	NA	NA	NA	NA
Aroclor-1254	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA
Gamma-chlordane	NA	NA	NA	NA	NA	NA
Miscellaneous						
% moisture	10.9	10	15.1	10.9	11.5	14.2
pH	4.36	4.95	6.64	NA	NA	NA

TABLE 2

ANALYTICAL RESULTS FOR EASTERN HALF OF AREA OF CONCERN 1
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Point ID	GB30	GB30	GB30	GB30	GB32	GB32
Sample Depth (in feet)	0.75 - 1	1.5 - 2	2.5 - 3	2.5 - 3	0.5 - 1	1 - 1.5
Material	soil/waste	soil/waste	soil/waste	soil/waste	waste/soil	waste/soil
Metals (mg/kg)						
Aluminum	18,000	18,800	4,320	17,100	19,900	16,000
Antimony	--	--	0.52 J	1.2 J	0.88 J	1.4 J
Arsenic	66.0 J	55.3 J	13.9	64.9 J	71.4	46.7
Barium	140	160	81.5	147	132	142
Beryllium	--	--	--	--	--	--
Cadmium	14.2 J	11.9 J	6.1	16.7 J	18.5	12.7
Calcium	5,910	60,500	177,000	72,700	60,700	126,000
Chromium	35.5	80.1	53.3	89.9	73.7	83
Cobalt	12.6	8.6 J	1.4 J	8.3 J	9.9 J	2.9 J
Copper	27.9	46.3	16.5	65.9	57.2	87.6
Iron	21,500	16,900	3,310	15,300	16,900	9,040
Lead	7.3	26.5	31.4	28.2	32.5	43.5
Magnesium	5,130	2,340	--	1,690	2,150	687 J
Manganese	388 J	246 J	22.7	265 J	327	82.7
Mercury	--	--	--	--	--	0.8
Molybdenum	--	2.8	1.4	5.5	3	4.3
Nickel	58.9	23.7	3.2 J	23.5	24.5 J	8.6 J
Potassium	1,240 J	2,390 J	1,040 J	2,240 J	1,830 J	2,420 J
Selenium	1.3	3.4	1.9	4.2 J	2.4	3.3
Silver	--	--	1.4 J	--	--	--
Sodium	--	--	--	--	--	3210
Thallium	--	--	--	--	--	--
Vanadium	45	62.6	17.3	62.5	60.7	40.4
Zinc	236 J	160 J	41.5	219 J	236	107
Volatile Organic Compo						
4-methyl-2-pentanone	--	5 J	--	NA	--	--
Toluene	--	--	--	NA	--	--
Semivolatile Organic Co						
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA
Total PAHS	NA	NA	NA	NA	NA	NA
Pesticides (in mg/kg)						
4,4'-DDE	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA
Aldrin	NA	NA	NA	NA	NA	NA
Alpha-Chlordane	NA	NA	NA	NA	NA	NA
Aroclor-1248	NA	NA	NA	NA	NA	NA
Aroclor-1254	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA
Gamma-chlordane	NA	NA	NA	NA	NA	NA
Miscellaneous						
% moisture	16.7	15.8	11	17.3	9.2	19.8
pH	NA	NA	NA	NA	NA	NA

TABLE 2

ANALYTICAL RESULTS FOR EASTERN HALF OF AREA OF CONCERN 1
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Point ID	GB33	GB33	GB33	GB34	GB34	GB34
Sample Depth (in feet)	0.5 - 1	1 - 1.5	3 - 3.5	0.25 - 0.5	0.5 - 1	3 - 3.5
Material	waste	soil	soil	waste	soil	soil
Metals (mg/kg)						
Aluminum	14,800	25,800	18,300	16,500	13,000	14,400
Antimony	0.30 J	--	--	--	--	--
Arsenic	87.6	112	58.4	155	65.5	9.4
Barium	131	172	200	165	147	574
Beryllium	--	0.20 J	--	--	--	--
Cadmium	42.6	5.6 J	3.6 J	9.7 J	5.5 J	0.82 J
Calcium	15,500	3,710	3,840	48,500	10,500	6,690
Chromium	40.2	47.6	34.1	49	30.5	27.8
Cobalt	7.6 J	11.8 J	15.1 J	11.5 J	8.6 J	12.4 J
Copper	32.9	16.9	19	47.2	22	18.9
Iron	16,000	28,400	22,500	16,200	16,500	21,200
Lead	8.7	7.2 J	7.8 J	25.9 J	8.6 J	9.0 J
Magnesium	1,350	4,890	5,770	1,560	1,650	6,010
Manganese	297	342 J	647 J	365 J	170 J	391 J
Mercury	--	--	--	--	--	--
Molybdenum	1.3	--	--	--	--	--
Nickel	34.9 J	60.8	50.9	21.7	22.3	56.7
Potassium	1,030 J	881 J	1,090 J	1,340 J	797 J	1,170 J
Selenium	0.58 J	0.95 J	0.64 J	1.9	0.58 J	--
Silver	--	--	--	--	--	--
Sodium	--	419 J	596 J	--	--	--
Thallium	--	--	--	--	--	--
Vanadium	48.2	64.8	51.3	55.4	45.6	46.2
Zinc	1010	179 J	110 J	127 J	107 J	59.2 J
Volatile Organic Compo						
4-methyl-2-pentanone	--	--	--	--	--	--
Toluene	--	--	--	--	--	--
Semivolatile Organic Co						
Benzo(a)anthracene	--	--	--	NA	NA	NA
Benzo(a)pyrene	--	--	--	NA	NA	NA
Benzo(b)fluoranthene	--	--	--	NA	NA	NA
Benzo(k)fluoranthene	--	--	--	NA	NA	NA
Chrysene	--	--	--	NA	NA	NA
Fluoranthene	--	--	--	NA	NA	NA
Phenanthrene	--	--	--	NA	NA	NA
Phenol	--	--	--	NA	NA	NA
Pyrene	350	390	360	NA	NA	NA
Total PAHS	--	--	--	NA	NA	NA
Pesticides (in mg/kg)						
4,4'-DDE	--	--	--	NA	NA	NA
4,4'-DDT	--	--	--	NA	NA	NA
Aldrin	--	--	--	NA	NA	NA
Alpha-Chlordane	--	--	--	NA	NA	NA
Aroclor-1248	--	--	--	NA	NA	NA
Aroclor-1254	--	--	--	NA	NA	NA
Dieldrin	--	--	--	NA	NA	NA
Gamma-chlordane	--	--	--	NA	NA	NA
Miscellaneous						
% moisture	6.9	15.7	8.9	6.9	6.2	16.7
pH	4.9	6.01	6.49	6.33	NA	6.46

TABLE 2

ANALYTICAL RESULTS FOR EASTERN HALF OF AREA OF CONCERN 1
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Point ID	GB35	GB35	GB35	GB35	GB36	GB36	GB36
Sample Depth (in feet)	0.5 - 1	1 - 1.5	1.5 - 2	3.5 - 4	0.5 - 1	1 - 1.5	3 - 3.5
Material	waste	waste/soil	waste/soil	soil	waste	soil	soil
Metals (mg/kg)							
Aluminum	18,900	10,100	17,500	19,800	23,300	14,400	16,700
Antimony	--	2.5	--	--	--	--	--
Arsenic	34.2 J	50.5	121	5.6	77.2	76.9	7.3 J
Barium	168	106	171	229	162	157	166
Beryllium	--	--	--	--	--	--	--
Cadmium	6.4 J	9.2 J	10.6 J	--	31.4 J	13.6 J	--
Calcium	42,100	188,000	4,300	3,410	5,480	2,220	3,480
Chromium	61	101	35.6	35.3	58	30.5	30.3
Cobalt	11.9 J	3.0 J	36.3 J	22.7 J	5.6 J	13.5 J	6.1 J
Copper	34.1	29.3	18.5	15	278	17.2	14.6
Iron	24,300	8,630	19,000	25,500	18,000	17,300	21,800
Lead	51.5 J	27.8 J	8.4 J	9.2 J	10.6 J	6.8 J	5.9
Magnesium	1,830	726 J	2,450	6,030	1,320	1,560	4,980
Manganese	605 J	76.0 J	1,000 J	775 J	162 J	459 J	119 J
Mercury	--	--	--	--	--	--	--
Molybdenum	--	5.1	--	--	--	--	--
Nickel	29.1	7.6 J	50.3	77.4	18.3	33.1	29.5
Potassium	1,530 J	1,320 J	1,190 J	903 J	2,450 J	867 J	1,380 J
Selenium	4.7	4.2	2.5 J	0.67 J	0.81 J	0.61 J	--
Silver	--	--	--	--	--	--	--
Sodium	--	--	--	--	--	--	--
Thallium	--	--	--	--	--	--	--
Vanadium	86.5	66.5	53.3	56.2	132	45.9	51
Zinc	144 J	79.8 J	189 J	44.8 J	324 J	170 J	41.4 J
Volatile Organic Compo							
4-methyl-2-pentanone	--	--	--	--	--	--	--
Toluene	--	--	--	--	--	--	--
Semivolatile Organic Co							
Benzo(a)anthracene	--	--	NA	--	NA	NA	--
Benzo(a)pyrene	--	--	NA	--	NA	NA	--
Benzo(b)fluoranthene	--	--	NA	--	NA	NA	--
Benzo(k)fluoranthene	--	--	NA	--	NA	NA	--
Chrysene	--	--	NA	--	NA	NA	--
Fluoranthene	--	--	NA	--	NA	NA	--
Phenanthrene	--	--	NA	--	NA	NA	--
Phenol	--	--	NA	--	NA	NA	1900
Pyrene	360	450	NA	400	NA	NA	--
Total PAHS	--	--	NA	--	NA	NA	--
Pesticides (in mg/kg)							
4,4'-DDE	--	--	NA	--	NA	NA	--
4,4'-DDT	8 J	3 J	NA	--	NA	NA	--
Aldrin	--	--	NA	--	NA	NA	--
Alpha-Chlordane	--	--	NA	--	NA	NA	--
Aroclor-1248	--	--	NA	--	NA	NA	--
Aroclor-1254	--	--	NA	--	NA	NA	--
Dieldrin	--	4 J	NA	--	NA	NA	--
Gamma-chlordane	1 J	--	NA	--	NA	NA	--
Miscellaneous							
% moisture	9.3	26.3	11.4	16.7	8.6	11.1	11.1
pH	4.95	4.64	5.34	6.13	5.3	5.57	6.92

TABLE 2

ANALYTICAL RESULTS FOR EASTERN HALF OF AREA OF CONCERN 1
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Point ID	GB37	GB37	GB37	GB38	GB38	GB38
Sample Depth (in feet)	0.75 - 1.25	1.25 - 1.75	3.25 - 3.75	0.5 - 1	1 - 1.5	3 - 3.5
Material	waste	soil	soil	waste	soil	soil
Metals (mg/kg)						
Aluminum	19,100	27,100	19,400	17,800	14,400	27,500
Antimony	--	--	--	--	--	--
Arsenic	83.2	77.5 J	12.6 J	53.3	40.9	13.6
Barium	157	338	153	148	159	483
Beryllium	--	--	--	--	--	-
Cadmium	13.3 J	0.86 J	1.0 J	13.5 J	5.9 J	--
Calcium	33,300	4,220	4,450	8,010	4,070	7,370
Chromium	98.7	49.8	33.1	40.1	33.5	51.6
Cobalt	6.8 J	14.4	12.8	6.9 J	14.1 J	25.0 J
Copper	113	16	19.3	67.5	27.9	37.9
Iron	16,800	30,100	24,500	16,700	16,200	43,400
Lead	17.4 J	7.9	6.3	15.2 J	8.0 J	14.9 J
Magnesium	1,190	5,110	6,220	1,470	1,800	13,900
Manganese	157 J	386 J	436 J	175 J	343 J	933 J
Mercury	--	--	--	--	--	--
Molybdenum	1.6	--	--	1.7	--	--
Nickel	20.5	59.1	45.3	23	26	87.2
Potassium	1,810 J	967 J	1,310 J	1,210 J	796 J	2,190 J
Selenium	1.8	--	--	1.4	0.61 J	--
Silver	--	--	--	--	--	--
Sodium	--	--	--	--	--	--
Thallium	--	--	--	--	--	--
Vanadium	74.5	66.4	56.4	57.7	51.3	96.8
Zinc	182 J	44.4 J	61.1 J	212 J	84.3 J	103 J
Volatile Organic Compo						
4-methyl-2-pentanone	--	NA	--	--	5 J	--
Toluene	--	NA	--	--	--	--
Semivolatile Organic Co						
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA
Total PAHS	NA	NA	NA	NA	NA	NA
Pesticides (in mg/kg)						
4,4'-DDE	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA
Aldrin	NA	NA	NA	NA	NA	NA
Alpha-Chlordane	NA	NA	NA	NA	NA	NA
Aroclor-1248	NA	NA	NA	NA	NA	NA
Aroclor-1254	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA
Gamma-chlordane	NA	NA	NA	NA	NA	NA
Miscellaneous						
% moisture	7.2	15	12.5	5.5	6.5	62.1
pH	NA	NA	NA	NA	NA	NA

TABLE 2

ANALYTICAL RESULTS FOR EASTERN HALF OF AREA OF CONCERN 1
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Point ID	GB39	GB39	GB39	GB42	GB42	GB42
Sample Depth (in feet)	0.5 - 1	1 - 1.5	3 - 3.5	0.5 - 1	1 - 1.5	3 - 3.5
Material	waste	soil	soil	waste	soil	soil
Metals (mg/kg)						
Aluminum	14,400	23,700	13,200	11,900	22,200	15,700
Antimony	--	--	--	--	--	--
Arsenic	55.9	37.1 J	4.8 J	11	7.7	4.7
Barium	153	201	152	177	138	80.6
Beryllium	--	0.34 J	--	--	--	--
Cadmium	20.8 J	4.4 J	--	1.1	--	--
Calcium	97,600	5,310	7,640	2,890	4,240	4,310
Chromium	138	39	27.9	29.8	43.8	25.9
Cobalt	3.7 J	30.0 J	10.6 J	11.2	5.1 J	6.2 J
Copper	63.6	14.9	13.9	18.0 J	14.7 J	14.1 J
Iron	11,400	24,000	18,000	17,800	25,600	21,300
Lead	28.3 J	9.1 J	6.5	11.1	6.3	5.5
Magnesium	926 J	3,090	5,730	1,740	3,670	6,240
Manganese	112 J	943 J	402 J	288	182	148
Mercury	--	--	--	--	--	--
Molybdenum	4.7	--	--	--	--	--
Nickel	14	39.5	41.4	19.7	30.9	25.9
Potassium	1,570 J	648 J	755 J	1110	778 J	1,120 J
Selenium	3.6	1.3 J	--	1.2	--	--
Silver	1.4 J	--	--	--	--	--
Sodium	--	--	--	--	--	--
Thallium	--	--	--	--	--	--
Vanadium	61.5	52.6	46.9	47.4	54.4	45.8
Zinc	210 J	168 J	32.4 J	60.5	35.8	39.4
Volatile Organic Compo						
4-methyl-2-pentanone	--	4 J	--	--	--	--
Toluene	--	--	--	0.8 J	--	--
Semivolatile Organic Co						
Benzo(a)anthracene	NA	NA	NA	--	--	--
Benzo(a)pyrene	NA	NA	NA	--	--	--
Benzo(b)fluoranthene	NA	NA	NA	--	--	--
Benzo(k)fluoranthene	NA	NA	NA	--	--	--
Chrysene	NA	NA	NA	--	--	--
Fluoranthene	NA	NA	NA	--	--	--
Phenanthrene	NA	NA	NA	--	--	--
Phenol	NA	NA	NA	--	--	820
Pyrene	NA	NA	NA	340	360	420
Total PAHS	NA	NA	NA	--	--	--
Pesticides (in mg/kg)						
4,4'-DDE	NA	NA	NA	--	--	--
4,4'-DDT	NA	NA	NA	--	--	--
Aldrin	NA	NA	NA	--	--	--
Alpha-Chlordane	NA	NA	NA	--	--	--
Aroclor-1248	NA	NA	NA	--	--	--
Aroclor-1254	NA	NA	NA	--	--	--
Dieldrin	NA	NA	NA	--	--	--
Gamma-chlordane	NA	NA	NA	--	--	--
Miscellaneous						
% moisture	11	14.9	17.9	2.3	9.1	21.3
pH	4.95	4.98	NA	NA	NA	NA

TABLE 2

ANALYTICAL RESULTS FOR EASTERN HALF OF AREA OF CONCERN 1
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Point ID	GB43	GB43	GB43	GB44	GB44	GB44
Sample Depth (in feet)	0.25 - 0.75	0.75 - 1.25	2.75 - 3.25	0.25 - 0.5	0.5 - 1	2.75 - 3.25
Material	waste	soil	soil	waste	soil	soil
Metals (mg/kg)						
Aluminum	22,000	17,300	15,300	12,300	11,100	23,600
Antimony	--	--	--	--	--	--
Arsenic	73.5	76.4	6.8	19.3	6.2	5.4
Barium	170	129	146	155	189	189
Beryllium	--	--	--	--	--	--
Cadmium	29.2	10	--	3.4	1.4	--
Calcium	4,700	2,530	4,770	2,550	2,250	3,960
Chromium	51.5	34.2	28	31.4	27.4	41.1
Cobalt	20.4	21.7	10.5 J	14.9	10.1 J	12.3
Copper	113 J	22.5 J	17.2 J	32.9 J	18.2 J	14.3 J
Iron	20,300	20,000	21,800	16,100	16,700	25,600
Lead	21.2	7.7	6.9	33.7	8	7.8
Magnesium	1,600	2,200	6,040	1,490	1,590	5,290
Manganese	321	1130	306	429	226	522
Mercury	--	--	--	0.69	--	--
Molybdenum	--	--	--	--	--	--
Nickel	22.6	45	48.1	21.1	19.7	54.8
Potassium	2170	1120	966 J	1230	945 J	715 J
Selenium	1.8	1.3	--	3	--	--
Silver	--	--	--	--	--	--
Sodium	--	--	--	--	--	--
Thallium	--	--	--	--	--	--
Vanadium	82.5	54.4	44.3	48.1	44.7	56
Zinc	305	291	47.1	108	73.5	40.8
Volatile Organic Compo						
4-methyl-2-pentanone	--	--	--	--	--	--
Toluene	--	--	--	--	--	--
Semivolatile Organic Co						
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA
Total PAHS	NA	NA	NA	NA	NA	NA
Pesticides (in mg/kg)						
4,4'-DDE	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA
Aldrin	NA	NA	NA	NA	NA	NA
Alpha-Chlordane	NA	NA	NA	NA	NA	NA
Aroclor-1248	NA	NA	NA	NA	NA	NA
Aroclor-1254	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA
Gamma-chlordane	NA	NA	NA	NA	NA	NA
Miscellaneous						
% moisture	6.7	9.6	13.9	4.7	8	17.9
pH	NA	NA	NA	NA	NA	NA

TABLE 2

ANALYTICAL RESULTS FOR EASTERN HALF OF AREA OF CONCERN 1
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Point ID	GB45	GB45	GB45	GB46	GB46	GB46
Sample Depth (in feet)	0.25 - 1	1.5 - 2	3.5 - 4	0.25 - 0.75	0.75 - 1.25	2.75 - 3.25
Material	waste	soil	soil	waste	soil	soil
Metals (mg/kg)						
Aluminum	17,800	21,500	16,200	11,800	9,860	17,800
Antimony	--	--	--	--	--	--
Arsenic	13	4.9	4.2	12.5	7.6	6.4
Barium	162	225	146	139	136	466
Beryllium	--	--	--	--	--	--
Cadmium	5.7	9.2	--	2.5	1.2	--
Calcium	2,860	2,790	2,950	5,070	2,300	56,400
Chromium	51.3	37.4	36.8	26.9	22.2	29.8
Cobalt	7.5 J	19.7	9.7 J	7.3 J	9.5 J	13.3 J
Copper	37.9 J	13.3 J	11.2 J	19.6 J	14.2 J	12.4 J
Iron	17,500	22,800	20,300	13,400	12,800	19,600
Lead	23.8	7.8	5.7	11.9	6.7	6.9
Magnesium	1,280	3,310	4,890	1,350	1,420	7,840
Manganese	207	886	318	175	267	531
Mercury	--	--	--	--	--	--
Molybdenum	--	--	--	--	--	--
Nickel	19.2	46.4	33.6	18.7	17.1	42.1
Potassium	1220	696 J	638 J	898 J	739 J	900 J
Selenium	2.3	--	--	--	--	--
Silver	--	--	--	--	--	--
Sodium	--	--	--	--	--	--
Thallium	--	--	--	--	--	--
Vanadium	65.6	53.7	43.9	38.9	36.2	47.2
Zinc	97.8	136	32.5	70.7	48.5	36.2
Volatile Organic Compo						
4-methyl-2-pentanone	--	--	5 J	--	--	--
Toluene	--	--	--	--	--	--
Semivolatile Organic Co						
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA
Total PAHS	NA	NA	NA	NA	NA	NA
Pesticides (in mg/kg)						
4,4'-DDE	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA
Aldrin	NA	NA	NA	NA	NA	NA
Alpha-Chlordane	NA	NA	NA	NA	NA	NA
Aroclor-1248	NA	NA	NA	NA	NA	NA
Aroclor-1254	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA
Gamma-chlordane	NA	NA	NA	NA	NA	NA
Miscellaneous						
% moisture	6.6	32.2	10.9	5.4	7.8	26.8
pH	NA	NA	NA	NA	NA	NA

TABLE 2

ANALYTICAL RESULTS FOR EASTERN HALF OF AREA OF CONCERN 1
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Point ID	GB47	GB47	GB47	GB48	GB48	GB48
Sample Depth (in feet)	0.25 - 0.75	0.75 - 1.25	2.75 - 3.25	0.25 - 0.75	0.75 - 1.25	2.75 - 3.25
Material	waste	soil	soil	waste	soil	soil
Metals (mg/kg)						
Aluminum	15,500	18,600	9,510	11,300	13,000	18,800
Antimony	--	--	--	--	--	--
Arsenic	10	6.3 J	4.3 J	13.7 J	7.2 J	4.2 J
Barium	165	139	91.1	156	179	337
Beryllium	--	--	--	--	--	--
Cadmium	5.1	4.0 J	--	4.6 J	2.6 J	--
Calcium	2,820	3,510	2,920	2,340	2,090	2,780
Chromium	33.8	30.4	18.6	24	24.8	28.7
Cobalt	17.5	10.4 J	8.7 J	9.6 J	10.8 J	10.6 J
Copper	25.9 J	15.7	13.3	25.3	16.3	17.7
Iron	15,100	19,900	15,900	13,400	14,200	22,000
Lead	14.2	6.1	5.6	32.7	10.7	6.2
Magnesium	1,440	2,610	3,970	1,380	1,500	6,260
Manganese	522	360 J	228 J	347 J	396 J	396 J
Mercury	--	--	--	0.76	--	--
Molybdenum	--	--	--	--	--	--
Nickel	19	26.7	19.8	18.2	17.9	28.8
Potassium	916 J	833 J	1,220 J	746 J	721 J	1,500 J
Selenium	1.5	--	--	2.6	--	--
Silver	--	--	--	--	--	--
Sodium	--	--	--	--	--	--
Thallium	--	--	--	--	--	--
Vanadium	59.6	47.8	37.9	44.8	44.5	46.4
Zinc	95.7	125 J	37.1 J	93.1 J	99.5 J	46.6 J
Volatile Organic Compo						
4-methyl-2-pentanone	--	--	--	--	--	--
Toluene	--	--	--	--	--	--
Semivolatile Organic Co						
Benzo(a)anthracene	NA	NA	NA	--	--	--
Benzo(a)pyrene	NA	NA	NA	--	--	--
Benzo(b)fluoranthene	NA	NA	NA	--	--	--
Benzo(k)fluoranthene	NA	NA	NA	--	--	--
Chrysene	NA	NA	NA	--	--	--
Fluoranthene	NA	NA	NA	--	--	--
Phenanthrene	NA	NA	NA	--	--	--
Phenol	NA	NA	NA	--	--	760
Pyrene	NA	NA	NA	350	400	380
Total PAHS	NA	NA	NA	--	--	--
Pesticides (in mg/kg)						
4,4'-DDE	NA	NA	NA	--	--	--
4,4'-DDT	NA	NA	NA	--	--	--
Aldrin	NA	NA	NA	--	--	--
Alpha-Chlordane	NA	NA	NA	--	--	--
Aroclor-1248	NA	NA	NA	--	--	--
Aroclor-1254	NA	NA	NA	--	--	--
Dieldrin	NA	NA	NA	--	--	--
Gamma-chlordane	NA	NA	NA	--	--	--
Miscellaneous						
% moisture	6.7	19.8	17.9	5.4	18.4	14.2
pH	NA	NA	NA	4.88	5.64	7.15

TABLE 2

ANALYTICAL RESULTS FOR EASTERN HALF OF AREA OF CONCERN 1
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Point ID	GB49	GB49	GB49	GB52	GB52	GB52
Sample Depth (in feet)	0.5 - 1	1 - 1.5	3 - 3.5	0.5 - 1	1 - 1.5	3.5 - 4
Material	waste	soil	soil	waste	soil	soil
Metals (mg/kg)						
Aluminum	12,500	9,970	22,400	13,900	12,800	15,000
Antimony	--	--	--	--	--	--
Arsenic	19.3 J	7.8 J	5.2 J	10.2 J	8.9 J	5.9 J
Barium	152	142	155	166	168	227
Beryllium	--	--	--	--	--	--
Cadmium	3.6 J	5.4 J	--	2.2 J	0.86 J	--
Calcium	5,070	3,310	3,760	9,880	3,970	3,630
Chromium	30.3	23.5	40	45.7	28.8	26.8
Cobalt	5.7 J	7.9 J	13.0 J	11.5	9.5 J	13.1
Copper	336	70	16.5	34.7	35.6	19.9
Iron	16,200	13,100	25,700	22,500	17,500	21,600
Lead	273	53.9	14.5	98.8	299	13
Magnesium	1,660	1,530	6,050	6,820	2,570	6,500
Manganese	156 J	227 J	452 J	503 J	335 J	628 J
Mercury	4.3	1.3	--	--	1.7	--
Molybdenum	--	--	--	--	--	--
Nickel	15.2	21.1	50.6	43	20.5	50.6
Potassium	790 J	637 J	831 J	928 J	736 J	1,530 J
Selenium	20.5	4.6	--	2.7	9.1	--
Silver	--	--	--	--	--	--
Sodium	--	--	--	--	--	--
Thallium	--	--	--	--	--	--
Vanadium	51	37.8	56.4	41.9	46.4	46.4
Zinc	147 J	246 J	42.1 J	197 J	140 J	54.9 J
Volatile Organic Compounds (mg/kg)						
4-methyl-2-pentanone	--	--	--	--	--	--
Toluene	--	--	--	--	--	--
Semivolatile Organic Compounds (mg/kg)						
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA
Total PAHS	NA	NA	NA	NA	NA	NA
Pesticides (in mg/kg)						
4,4'-DDE	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA
Aldrin	NA	NA	NA	NA	NA	NA
Alpha-Chlordane	NA	NA	NA	NA	NA	NA
Aroclor-1248	NA	NA	NA	NA	NA	NA
Aroclor-1254	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA
Gamma-chlordane	NA	NA	NA	NA	NA	NA
Miscellaneous						
% moisture	3.9	5.9	23.4	1.5	9.9	21.6
pH	NA	NA	NA.	NA	NA	NA

Notes:
Compounds that were not detected in any sample are not listed in this table
mg/kg = milligrams per kilogram,
μg/kg = micrograms per kilogram
J = Estimated value, NA = Not analyzed, -- = Not detected
Results less than 10 are reported to two significant figures.
Results greater than 10 are reported to three significant figures.

TABLE 3

ANALYTICAL RESULTS FOR BARREN SOIL AREAS
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Location Sample Depth (in feet) Material	GB23 0.0 - 0.5 soil	GB23 0.5 - 1.0 soil	GB23 2.0 - 2.5 soil	GB24 0.0 - 0.5 waste	GB24 1.0 - 1.5 soil	GB24 2.0 - 2.5 soil	GB25 0.0 - 0.5 waste	GB25 0.75 - 1.25 soil	GB25 3.0 - 3.5 soil
Metals (mg/kg)									
Aluminum	10,500	14,100	15,500	12,500	11,900	3,320	13,500	25,000	20,600
Antimony	--	--	--	2.5	--	--	2	0.89 J	--
Arsenic	27.4	33.8	25.6	10.4 J	22.4 J	11.1	23.7	41.4	4.7
Barium	126	207	114	139	130	34.1 J	133	173	171
Beryllium	--	--	--	--	--	--	--	--	--
Cadmium	5.3	1.9	2.7	4.4 J	8.0 J	13.6	4.6	26.6	0.42 J
Calcium	6,150	3,760	12,500	130,000	80,300	1,400	168,000	10,200	4,580
Chromium	26.4	28.9	36.3	125	48	10.2	124	95	39
Cobalt	18	10.9 J	8.6 J	4.0 J	9.1 J	1.2 J	--	7.8 J	11.7 J
Copper	27.2 J	18.2 J	18.7 J	27.8	23.9	26.7 J	21.9	193	15
Iron	13,900	16,100	16,400	14,400	15,500	5,420	7,190	16,800	21,400
Lead	25	7.9	13.5	35.1	12.9	2.3	45	7.7 J	7.2
Magnesium	1,560	1,690	1,840	2,730	6,790	--	--	1,280	4,360
Manganese	395	228	259	69.2 J	382 J	22.6	29.6	326	738
Mercury	--	--	--	--	--	--	--	--	--
Molybdenum	--	--	--	8.4	--	0.37 J	10.4	3.3 J	--
Nickel	21.6	17.7	17.8	8.3 J	36.4	4.7 J	3.2 J	14.0 J	47.3
Potassium	1,540	1,340	1,320	11,900 J	1,890 J	612 J	8,820 J	6,390 J	1,330 J
Selenium	1.7	--	1.6	3.6	1.4	--	12.9	3.5 J	0.80 J
Silver	--	--	--	0.67 J	--	--	3.2	--	--
Sodium	--	--	--	6,270	--	--	10,800	2480	--
Thallium	--	--	--	--	--	--	--	--	--
Vanadium	42.4	46	56.7	77	41.1	11	67.2	220	52.1
Zinc	93.4	53.5	71.5	96.8 J	195 J	178	77.2	628	42
Volatile Organic Compounds (μg/kg)									
none detected	NA	--	--	NA	--	NA	NA	--	--
Semivolatile Organic Compounds (μg/kg)									
Benzo(a)anthracene	76 J	--	--	NA	--	--	--	--	--
Benzo(a)pyrene	51 J	--	--	NA	--	--	--	--	--
Benzo(b)fluoranthene	79 J	--	--	NA	--	--	--	--	--
Chrysene	86 J	--	--	NA	--	--	--	--	--
Fluoranthene	230 J	--	--	NA	--	--	--	--	--
Phenanthrene	120 J	--	--	NA	--	--	--	--	--
Phenol	--	1,600	--	NA	630	--	--	--	--
Pyrene	190 J	390	390	NA	380	350	400	370	380
Total PAHS	830	--	--	NA	--	--	--	--	--
Pesticides (in μg/kg)									
4,4'-DDE	3 J	--	--	NA	--	--	--	--	--
4,4'-DDT	8 J	--	--	NA	--	--	4 J	--	--
Aldrin	1 J	--	--	NA	--	--	3	--	--
Alpha-chlordane	--	--	--	NA	--	--	2 J	--	--
Aroclor-1248	35 J	26 J	8 J	NA	--	--	--	-	--
Aroclor-1254	--	--	--	NA	--	--	58	--	--
Dieldrin	2 J	--	--	NA	--	--	3 J	--	--
Gamma-chlordane	2	2 J	--	NA	--	--	3	--	--
Miscellaneous									
% moisture	12.2	15.4	16.4	9.9	12.9	7	18.3	11	14.3
pH	NA	NA	NA	NA	6.93	NA	3.53	4.04	6.04

Notes:

Compounds that were not detected in any sample are not listed in this table
mg/kg = milligrams per kilogram
μg/kg = micrograms per kilogram
J = Estimated value, NA = Not analyzed, -- = Not detected
Results less than 10 are reported to two significant figures and results greater than 10 are reported to three significant figures.

TABLE 4

SCREENING-LEVEL HUMAN HEALTH RISK EVALUATION
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Chemical of Potential Concern	Exposure Point Concentration	2000 Industrial PRG		Cancer Risk	Hazard Quotient
		Cancer	Noncancer		
Metals (mg/kg)					
Aluminum	32,700	--	1,700,000	--	0.02
Antimony	3.5	--	820	--	< 0.01
Arsenic	287	2.7	440	1.1E-04	0.65
Barium	574	--	120,000	--	< 0.01
Beryllium	0.34	2200	3,700	1.5E-10	< 0.01
Cadmium	81.8	3,000	810	2.7E-08	0.10
Chromium	138	450	--	3.1E-07	--
Cobalt	36.3	--	120,000	--	< 0.01
Copper	336	--	76,000	--	< 0.01
Iron	43,400	--	610,000	--	0.07
Manganese	1,130	--	32,000	--	0.04
Mercury	21.4	--	610	--	0.04
Molybdenum	10.4	--	10,000	--	< 0.01
Nickel	87.2	--	41,000	--	< 0.01
Selenium	68.3	--	10,000	--	< 0.01
Silver	3.2	--	10,000	--	< 0.01
Vanadium	220	--	14,000	--	0.02
Zinc	1,010	--	610,000	--	< 0.01
Volatile Organic Compounds (mg/kg)					
Methyl isobutyl ketone	0.005	--	2,900	--	< 0.01
Toluene	0.002	--	2,000	--	< 0.01
Semivolatile Organic Compounds (mg/kg)					
Benzo(a)anthracene	0.076	2.9	--	2.6E-08	--
Benzo(a)pyrene	0.054	0.29	--	1.9E-07	--
Benzo(b)fluoranthene	0.087	2.9	--	3.0E-08	--
Benzo(k)fluoranthene	0.048	29	--	1.7E-09	--
Chrysene	0.086	290	--	3.0E-10	--
Fluoranthene	0.23	--	30,000	--	< 0.01
Phenanthrene	0.12	--	54,000	--	< 0.01
Phenol	1.9	--	530,000	--	< 0.01
Pyrene	0.19	--	54,000	--	< 0.01
Pesticides/PCBs(mg/kg)					
Aldrin	0.0032	0.15	26	2.1E-08	< 0.01
alpha-Chlordane	0.0018	11	670	1.6E-10	< 0.01
gamma-Chlordane	0.0033	11	670	3.0E-10	< 0.01
Aroclor-1248	0.049	1	--	4.9E-08	--
Aroclor-1254	0.058	1	14	5.8E-08	< 0.01
4,4'-DDE	0.0032	12	--	2.7E-10	--
4,4'-DDT	0.012	12	760	1.0E-09	< 0.01
Dieldrin	0.0091	0.15	44	6.1E-08	< 0.01
			TOTAL:	1.1E-04	0.93

TABLE 5

SUMMARY OF REMEDIAL ACTION SUBSITE 4 AND AREA OF CONCERN 1 SOIL CONCENTRATIONS PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Analyte	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Average Detected Concentration (mg/kg)	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Average Detected Concentration (mg/kg)
	RASS 4			AOC1		
Arsenic	3.5	206	49.9	2.8	287	49.1
Cadmium	0.04	22.1	5.71	0.86	64.9	10.76
Copper	8.7	164	48.8	13.3	336	58.9
Lead	6.7	5,980	360	1.9	11,400	325
Mercury	0.03	143	8.15	0.1	113	14.5
Selenium	0.31	657	35.5	0.42	875	28.6
Zinc	21.9	572	149	20.7	1,010	167.7

Notes:
mg/kg = milligrams per kilogram

TABLE 6

SPECIAL STATUS SPECIES OBSERVED OR POTENTIALLY OCCURRING IN AREA OF CONCERN 1

PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Common Name	Scientific Name	Federal Status	State Status	Habitat	Present in AOC 1[a]
White-tailed Kite (formerly black shouldered kite)	*Elanus leucurus* (nesting)	MNBMC	CFP	Coastal and valley lowlands	O
Northern Harrier	*Circus cyaneus*	None	CSC	Fresh and salt water, emergent wetlands	O
Cooper's Hawk	*Accupter cooperii*	None	CSC	Riparian areas	O
Swainson's Hawk	*Buteo swainsoni*	None	CT	Open, riparian habitat	P
Prairie Falcon	*Falco mexicanus*	None	CSC ACWL	Associated primarily with perennial grasslands	O
California Horned Lark	*Eremophila alpestris actia*	None	CSC	Found in grasslands along coast	O
Loggerhead Shrike	*Lanius ludovicianus*	(FSC) MNBMC	CSC ACWL	Common resident in lowlands and foothills of California	O

Notes:

Status

Species of special conservation status, as registered in the California Department of Fish and Game's Natural Diversity Data Base, are indicated by the following codes:

ACWL Audubon Society California Watch List
CFP California Department of Fish and Game: Fully Protected
CSC California Department of Fish and Game: Species of Special Concern
CT State of California Threatened Species
(FSC) Federal Special Concern Species (not an "active" term per U.S. Fish and Wildlife Service; provided for informational purposes only)
MNBMC U.S. Fish and Wildlife Service: Migratory Nongame Birds of Management Concern

[a]*Species Presence*

O Observed during surveys or incidentally during field investigation
P Potentially occurring at or near AOC1

TABLE 7

ASSESSMENT AND MEASUREMENT ENDPOINTS FOR SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT

PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Receptor Class	Assessment Endpoint	Representative Species	Measurement Endpoints	Decision Criteria
PRIMARY PRODUCERS Upland plants	Protection and maintenance of populations of upland plants	NA	• Comparison of concentrations of chemicals in soil to ORNL plant benchmarks • Comparison of soil concentrations with phytotoxicity values from literature	Chemical concentrations that significantly exceed available literature-derived effects levels indicate risk to upland plants at the site.
PRIMARY CONSUMERS Soil invertebrates	Protection of populations of soil invertebrates	NA	• Comparison of concentrations of chemicals in soil to ORNL earthworm benchmarks • Comparison of soil concentrations with toxicity values from literature	Chemical concentrations that significantly exceed available literature-derived effects levels indicate risk to soil invertebrates at the site.
SECONDARY CONSUMERS Passerine birds	Protection of populations of passerine birds	Western Meadowlark	• Food-chain modeling and comparison with TRVs - Concentration of chemicals in soils - Concentration of chemicals in tissues collected from RASS 4 - Tissue concentrations based on published bioaccumulation factors	An HQ approach was used to evaluate risk (HQ = dose/TRV). Chemicals for which site-specific doses exceed the high TRV were weighted most heavily.
TERTIARY CONSUMERS Carnivorous birds (raptors)	Protection of populations of raptor species	Northern Harrier	• Food-chain modeling and comparison with TRVs - Concentration of chemicals in soils - Concentration of chemicals in tissues collected from RASS 4 - Tissue concentrations based on published bioaccumulation factors	An HQ approach was used to evaluate risk (HQ = dose/TRV). Chemicals for which site-specific doses exceed the high TRV were weighted most heavily.

TABLE 7

ASSESSMENT AND MEASUREMENT ENDPOINTS FOR SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT

PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Receptor Class	Assessment Endpoint	Representative Species	Measurement Endpoints	Decision Criteria
TERTIARY CONSUMERS Large carnivorous mammals	Protection of populations of carnivorous mammals	Gray fox	• Food-chain modeling and comparison with TRVs - Concentration of chemicals in soils - Concentration of chemicals in field tissues collected from RASS 4 - Tissue concentrations based on published bioaccumulation factors	An HQ approach was used to evaluate risk (HQ = dose/TRV). Chemicals for which site-specific doses exceed the high TRV were weighted most heavily.

Notes:

NA	Not applicable
ORNL	Oak Ridge National Laboratory
RASS	Remedial action subsite
HQ	Hazard quotient
TRV	Toxicity reference value

TABLE 8
ANALYTICAL RESULTS FOR SOILS FROM 0 TO 2 FEET BELOW GROUND SURFACE
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Sample Location	SB01	SB01	SB02	SB02	SB03	SB04	SB04	SB05	SB06	SB06	SB08	GB23	GB23	GB24	GB24	GB25	GB25	GB26	GB27	GB27	GB28	GB28
Previous ID	AOC 1	AOC 1	AOC 2	AOC 3	AOC 3	AOC 4	AOC 4	AOC 5	AOC 6	AOC 6	AOC 8											
(depth, ft below grade)	0.7 - 1	1 - 1.5	0.25 - 0.5	0 - 0.5	1 - 1.5	0.5 - 1	1 - 1.5	0.25 - 0.5	0.25 - 0.75	0.75 - 1.25	0 - 0.5	0 - 0.5	0.5 - 1	0 - 0.5	1 - 1.5	0 - 0.5	0.75 - 1.25	1.5 - 2	1 - 1.5	1.5 - 2	0.5 - 1	1 - 1.5
Material	cinders	clayey silt	weathered pavement	gray silt (gypsum?)	silty clay	gray silt (gypsum?)	silty clay	gravel road base	gravel raod base	silty clay	silty clay (ash?)	soil	soil	waste	soil	waste	soil	waste	waste	soil	soil/waste	soil
Metals (mg/kg)																						
Aluminum	14,700	13,700	15,400	349	20,400	1,160	15,400	26,900	28,600	15,100	22,900	10,500	14,100	12,500	11,900	13,500	25,000	17,600	14,900	16,700	32,700	12,[illegible]00
Antimony	21.6	--	2.3	2.5	--	3.2	2.4	--	--	--	--	--	--	2.5	--	2	0.89 J	--	2.9	2.2 J	1.5 J	--
Arsenic	55.3	5.4	22.4	--	31.6	11.8	146	4	2.8	5.4	28.6	27.4	33.8	10.4 J	22.4 J	23.7	41.4	50.4	70.1	110	287	139
Barium	68	151	129	91.7	146	113	163	15.1 J	--	152	206	126	207	139	130	133	173	190	119	148	250	126
Beryllium	--	--	--	0.046 J	--	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	2.7	--	1.2	3	8.4	3.7	11.3	--	--	--	3.7	5.3	1.9	4.4 J	8.0 J	4.5	26.6	4.3	17.9	36.8	64.9	9.9
Calcium	26,100	2,080	8,220	288,000	29,200	313,000	43,800	12,800	17,900	2,650	13,300	6,150	3,760	130,000	80,300	168,000	10,200	26,200	68,400	38,800	49,900	2,930
Chromium	36.3 J	28.1 J	36.9 J	28.4 J	37.9 J	78 J	86.2 J	40 J	37.1 J	34.1 J	46.3 J	26.4	28.9	125	48	124	95	44.8	62.2	75.2	103	26.9
Cobalt	10.4 J	20.6	9.7 J	--	10.5 J		10.8 J	38.9	27.6	16.7	8.9 J	18	10.9 J	4.0 J	9.1 J	--	7.8 J	13.9	4.9 J	5.5 J	12.3 J	10.1 J
Copper	61.4 J	17.8 J	38.1 J	--	42.5 J	--	88.7 J	133 J	156 J	16.6 J	27.4 J	27.2 J	18.2 J	27.8	23.9	21.9	193	27.2	110	129	283	18.5
Iron	21,400	15,400	21,200	190	21,900	603	15,300	45,000	38,700	19,900	20,100	13,900	16,100	14,400	15,600	7,190	16,800	24,800	17,800	17,300	27,700	15,300
Lead	11,400	59.5	4,300	114	170	47.2	29.7	16.1	1.9	8	395	25	7.9	35.1	12.9	45	7.7 J	11.2	933	354	45.9 J	7.6
Magnesium	4,690	1,930	4,470	60.7 J	3,430	43.3 J	988 J	16,100	17,300	2,540	2,290	1,560	1,690	2,730	6,790	--	1,280	6,930	1,390	1,360	2,320	1,740
Manganese	407 J	396 J	264 J	--	322 J	--	407 J	1,360 J	695 J	712 J	200 J	395	228	69.2 J	382 J	29.6	326	498	116	157	450	300
Mercury	54.8	--	2.8	--	3.5	0.1 J	--	1.2	1.1	--	113	--	--	--	--	--	--	--	21.4	9.8	--	--
Molybdenum	--	--	--	--	--	--	--		--	--	--	--	--	8.4	--	10.4	3.3 J		2.9	4.2 J	1.9 J	--
Nickel	32.1 J	21.4 J	30.7 J	--	26.3 J	--	18.3 J	31.4 J	26.9 J	28.2 J	27.8 J	21.6	17.7	8.3 J	36.4	3.2 J	14.0 J	55.1 J	14.6	16.0 J	36.7	27.7
Potassium	986 J	799 J	994 J	139 J	1,520	217 J	1,920	907 J	711 J	956 J	1,640	1,540	1,340	11,900 J	1,890 J	8,820 J	5,390 J	1,520 J	1,740 J	1,850 J	3,140 J	869 J
Selenium	875 J	3.3 J	215 J	14.4 J	20.5 J	2.6 J	9.3 J	0.85 J	--	--	44.7 J	1.7		3.6	1.4	12.9	3.5 J	--	68.3	27.3 J	3.4 J	0.42 J
Silver	10.4	--	--	--	--	--	--	--	--	--	--			0.57 J	--	3.2	--	--	1.5 J	--	--	--
Sodium	619	--	392 J	--	265 J	--	361 J	--	--	--	--	--	--	6,270	--	10,800	2480	--	--	--	--	--
Thallium	--	--	--	1.4	--	12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	52.5	43.2	52.4	7 J	56	23.8	86.3	118	94.8	54.1	62.1	42.4	46	77	41.1	67.2	220	51.2	61.3	76.6	199	42.[illegible]
Zinc	106	59.2	92.8	20.7	194	51.2	92	90.1	52.2	38.4	131	93.4	53.6	96.8 J	195 J	77.2	628	94.6	250	345	700	127
Volatile Organic Compounds (µg/kg)																						
4-methyl-2-pentanone	--	--	NA	--	--	--	NA	NA	NA	NA	NA	NA	--	NA	--	NA	--	--	--	--	--	--
Acetone	95 J	60 J	NA	240 J	--		NA	NA	NA	NA	NA	NA		NA	--	NA	--	--	--	--	--	--
Toluene	--	--	NA	--	1	5 J	NA	NA	NA	NA	NA	NA	--	NA	--	NA	--	--	--	--	2 J	--
Semivolatile Organic Compounds (µg/kg)																						
Benzo(a)anthracene	--	--	--	--	--	--	--	--	--	--	--	75 J	--	NA	--	--	--	NA	75 J	--	NA	NA
Benzo(a)pyrene				--	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	54 J	--	NA	NA
Benzo(b)fluoranthene				--	--	--	--	--	--		--	--	--	--	--	--	--	NA	87 J	--	NA	NA
Benzo(k)fluoranthene				--	--	--	--	--	--	--	--	--		--	--	--	--	NA	48 J	--	NA	NA
Chrysene				--	--	--	--	--	--	--	--	--	--	--		--	--	NA	86 J	--	NA	NA
Fluoranthene				--	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	130 J	43 J	NA	NA
Phenanthrene				--	--	--	--	--	--	--		--	--	--	--	--	--	NA	77 J	--	NA	NA
Phenol				--	--	--	--	--	--	--	--	--	--	--	630	--	--	NA	--	--	NA	NA
Pyrene				--	--	--	--	--	--	--	--	--	--	--	380	400	370	NA	100 J	390	NA	NA
Total PAHS				--	--	--	--	--		--	--	--	--	--	--	--	--	NA	660	43	NA	NA
Pesticides/PCBs																						
4,4'-DDE	--	--	NA	--	--	--	NA	NA	NA	NA	NA	3 J	--	NA	--	--	--	NA	2 J	--	NA	NA
4,4'-DDT	--	--	NA	--	--	--	NA	NA	NA	NA	NA	8 J	--	NA	--	4 J	--	NA	12 J	6 J	NA	NA
Aldrin	--	--	NA	--	--	--	NA	NA	NA	NA	NA	1 J	--	NA	--	3	--	NA	--	--	NA	NA
Alpha-chlordane	--	--	NA	--	--	--	NA	NA	NA	NA	NA	--	--	NA	--	2 J	--	NA	--	--	NA	NA
Aroclor-1248	--	--	NA	--	--	--	NA	NA	NA	NA	NA	35 J	26 J	NA	--	--	--	NA	--	--	NA	NA
Aroclor-1254	--	--	NA	--	--	--	NA	NA	NA	NA	NA	--	--	NA	--	58	--	NA	--	--	NA	NA
Dieldrin	--	--	NA	--	--	--	NA	NA	NA	NA	NA	2 J	--	NA	--	3 J	--	NA	4 J	--	NA	NA
Gamma-chlordane	--	--	NA	--	--	--	NA	NA	NA	NA	NA	2	2 J	NA	--	3	--	NA	--	1 J	NA	NA

Notes:
-- = not detected
J = estimated concentration
NA = not analyzed
DL = detection limit
µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram

DS.0267.17348

TABLE 8
ANALYTICAL RESULTS FOR SOILS FROM 0 TO 2 FEET BELOW GROUND SURFACE
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Sample Location	GB29	GB29	GB30	GB30	GB32	GB32	GB33	GB33	GB34	GB34	GB35	GB35	GB35	GB36	GB36	GB37	GB37	GB38	GB38	GB39	GB39
Previous ID (depth, ft below grade)	0 - 0.5	0.75 - 1.25	0.75 - 1	1.5 - 2	0.5 - 1	1 - 1.5	0.5 - 1	1 - 1.5	0.25 - 0.5	0.5 - 1	0.5 - 1	1 - 1.5	1.5 - 2	0.5 - 1	1 - 1.5	0.75 - 1.25	1.25 - 1.75	0.5 - 1	1 - 1.5	0.5 - 1	1 - 1.5
Material	waste	soil	soil/waste	soil/waste	waste/soil	waste/soil	waste	soil	waste	soil	waste	waste/soil	waste/soil	waste	soil	waste	soil	waste	soil	waste	soil
Metals (mg/kg)																					
Aluminum	14,500	14,500	16,000	18,800	19,900	16,000	14,800	25,800	16,500	13,000	16,900	10,100	17,500	23,300	14,400	19,100	27,100	17,800	14,400	14,400	23,700
Antimony	0.73 J	--	--	--	0.88 J	1.4 J	0.30 J	--	--	--	--	2.5	--	--	--	--	--	--	--	--	--
Arsenic	43.7	86	66.0 J	55.3 J	71.4	46.7	87.5	112	155	55.5	34.2 J	50.5	121	77.2	76.9	83.2	77.5 J	53.3	40.9	55.9	37.1 J
Barium	110	131	140	160	132	142	131	172	166	147	168	106	171	162	157	157	338	148	159	153	231
Beryllium	--	--	--	--	--	--	--	0.20 J	--	--	--	--	--	--	--	--	--	--	--	--	0.34 J
Cadmium	9.2	17.3	14.2 J	11.9 J	18.5	12.7	42.6	5.6 J	9.7 J	5.5 J	6.4 J	9.2 J	10.6 J	31.4 J	13.6 J	13.3 J	0.86 J	13.5 J	5.9 J	20.8 J	4.4 J
Calcium	70,500	13,400	5,910	60,600	60,700	126,000	15,500	3,710	48,500	10,500	42,100	188,000	4,300	5,480	2,220	33,300	4,220	8,010	4,070	97,600	5,310
Chromium	72.1	30.8	55.5	80.1	73.7	83	40.2	47.6	49	30.5	61	101	35.6	58	30.5	98.7	49.8	40.1	33.5	138	39
Cobalt	3.8 J	7.7 J	12.6	8.6 J	9.9 J	2.9 J	7.6 J	11.8 J	11.5 J	8.6 J	11.9 J	3.0 J	36.3 J	5.6 J	13.5 J	6.8 J	14.4	6.9 J	14.1 J	3.7 J	30.0 J
Copper	78.3	50.1	27.9	46.3	57.2	87.6	32.9	16.9	47.2	22	34.1	29.3	18.5	278	17.2	113	16	67.5	27.9	63.6	14.9
Iron	11,800	15,300	21,600	16,900	16,900	9,040	16,000	28,400	16,200	16,500	24,300	8,630	19,000	8,000	7,300	16,800	30,100	16,700	16,200	11,400	24,000
Lead	18.7	17.7	7.3	26.5	32.5	43.5	8.7	7.2 J	25.9 J	8.6 J	51.5 J	27.8 J	8.4 J	10.6 J	6.8 J	17.4 J	7.9	15.2 J	8.0 J	28.3 J	9.1 J
Magnesium	844 J	1,280	5,130	2,340	2,150	667 J	1,350	4,890	1,560	1,650	1,830	726 J	2,450	1,320	1,560	1,190	5,110	1,470	1,800	926 J	3,090
Manganese	105	253	383 J	246 J	327	82.7	297	342 J	365 J	170 J	605 J	76.0 J	1,000 J	162 J	459 J	157 J	386 J	175 J	343 J	112 J	943 J
Mercury	--	--	--	--	--	0.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Molybdenum	2.1	--	--	2.8	3	4.3	1.3	--	--	--	--	5.1	--	--	--	1.6	--	1.7	--	4.7	--
Nickel	10.2 J	17.6	58.9	23.7	24.5 J	6.6 J	34.9 J	60.8	21.7	22.3	29.1	7.6 J	50.3	18.3	33.1	20.5	59.1	23	26	14	39.5
Potassium	1,500 J	1,250 J	1,240 J	2,390 J	1,830 J	2,420 J	1,030 J	881 J	1,340 J	797 J	1,530 J	1,320 J	1,190 J	2,450 J	867 J	1,810 J	967 J	1,210 J	796 J	1,570 J	648 J
Selenium	3.3	1.5	1.3	3.4	2.4	3.3	0.58 J	0.95 J	1.9	0.53 J	4.7	4.2	2.5 J	0.81 J	0.61 J	1.8	--	1.4	0.61 J	3.6	1.3 J
Silver	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.4 J	--
Sodium	--	--	--	--	--	3210	--	419 J	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	62.5	54.9	45	62.5	60.7	40.4	48.2	64.8	55.4	45.6	86.5	66.5	53.3	132	45.9	74.5	66.4	57.7	51.3	61.5	52.5
Zinc	97.3	204	236 J	160 J	236	107	1010	179 J	127 J	107 J	144 J	79.8 J	189 J	324 J	170 J	182 J	44.4 J	212 J	34.3 J	210 J	168 J
Volatile Organic Compounds (µg/kg)																					
4-methyl-2-pentanone	NA	--	--	5 J	--	--	--	--	--	--	--	--	--	--	--	--	NA	--	5 J	--	4 J
Acetone	NA	--	--	5 J	--	--	--	--	--	--	--	--	--	--	--	--	NA	--	5 J	--	4 J
Toluene	NA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NA	--	--	--	--
Semivolatile Organic Compounds (µg/kg)																					
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	--	--	NA	NA	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	--	--	NA	NA	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	--	--	NA	NA	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	--	--	NA	NA	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	--	--	NA	NA	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	--	--	NA	NA	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	--	--	NA	NA	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA	NA	--	--	NA	NA	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	350	390	NA	NA	360	450	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total PAHS	NA	NA	NA	NA	NA	NA	--	--	NA	NA	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs																					
4,4'-DDE	NA	NA	NA	NA	NA	NA	--	--	NA	NA	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	--	--	NA	NA	8 J	3 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	NA	NA	NA	NA	NA	NA	--	--	NA	NA	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Alpha-chlordane	NA	NA	NA	NA	NA	NA	--	--	NA	NA	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	NA	NA	NA	NA	NA	NA	--	--	NA	NA	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	NA	NA	NA	NA	NA	NA	--	--	NA	NA	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA	--	--	NA	NA	--	4 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gamma-chlordane	NA	NA	NA	NA	NA	NA	--	--	NA	NA	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
-- = not detected
J = estimated concentration
NA = not analyzed
DL = detection limit
µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram

TABLE 8
ANALYTICAL RESULTS FOR SOILS FROM 0 TO 2 FEET BELOW GROUND SURFACE
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Sample Location	GB42	GB42	GB43	GB43	GB44	GB44	GB45	GB45	GB46	GB46	GB47	GB47	GB48	GB48	GB49	GB49	GB52	GB52
Previous ID (depth, ft below grade)	0.5 - 1	1 - 1.5	0.25 - 0.75	0.75 - 1.25	0.25 - 0.5	0.5 - 1	0.25 - 1	1.5 - 2	0.25 - 0.75	0.75 - 1.25	0.25 - 0.75	0.75 - 1.25	0.25 - 0.75	0.75 - 1.25	0.5 - 1	1 - 1.5	0.5 - 1	1 - 1.5
Material	waste	soil	waste	soil	waste	soil	waste	soil	waste	soil	waste	soil	waste	soil	waste	soil	waste	soil
Metals (mg/kg)																		
Aluminum	11,900	22,200	22,000	17,300	12,300	11,100	17,800	21,500	11,800	9,650	15,500	18,600	11,300	13,000	12,500	9,970	13,900	12,800
Antimony	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic	11	7.7	73.5	76.4	19.3	6.2	13	4.9	12.5	7.6	10	6.3 J	13.7 J	7.2 J	19.3 J	7.8 J	10.2 J	8.9 J
Barium	177	138	170	129	155	189	162	225	139	136	155	139	166	179	152	142	166	168
Beryllium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	1.1	--	29.2	10	3.4	1.4	5.7	9.2	2.5	1.2	5.1	4.0 J	4.6 J	2.6 J	3.6 J	6.4 J	2.2 J	0.86 J
Calcium	2,690	4,240	4,700	2,530	2,550	2,250	2,860	2,790	5,070	2,500	2,820	3,510	2,540	2,090	5,070	3,310	9,880	3,970
Chromium	29.8	43.8	51.5	34.2	31.4	27.4	51.3	37.4	26.9	22.2	33.8	30.4	24	24.8	30.5	23.5	45.7	28.8
Cobalt	11.2	5.1 J	20.4	21.7	14.9	10.1 J	7.5 J	19.7	7.3 J	9.5 J	17.5	10.4 J	9.6 J	10.8 J	5.7 J	7.9 J	11.5	9.5 J
Copper	18.0 J	14.7 J	113 J	22.5 J	32.9 J	18.2 J	37.9 J	13.3 J	19.6 J	14.2 J	25.9 J	15.7	25.3	16.3	336	70	34.7	35.6
Iron	17,300	25,600	20,300	20,000	16,100	16,700	17,500	22,800	13,400	12,800	15,100	19,900	13,400	14,200	16,200	13,100	22,500	17,500
Lead	11.1	6.3	21.2	7.7	33.7	8	23.8	7.3	11.9	6.7	14.2	6.1	32.7	10.7	273	53.9	93.8	299
Magnesium	1,740	3,670	1,600	2,200	1,490	1,590	1,280	3,310	1,350	1,420	1,440	2,610	1,380	1,600	1,660	1,530	6,320	2,570
Manganese	288	182	321	1130	429	226	207	886	175	267	522	360 J	347 J	396 J	156 J	227 J	503 J	335 J
Mercury	--	--	--	--	0.69	--	--	--	--	--	--	--	0.76	--	4.3	1.3	--	1.7
Molybdenum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	19.7	30.9	22.6	45	21.1	19.7	19.2	46.4	18.7	17.1	19	26.7	18.2	17.9	15.2	21.1	43	20.5
Potassium	1110	778 J	2170	1120	1230	945 J	1220	696 J	898 J	739 J	916 J	833 J	746 J	721 J	790 J	637 J	928 J	736 J
Selenium	1.2	--	1.8	1.3	3	--	2.3	--	--	--	1.5	--	2.6	--	20.6	4.6	2.7	9.1
Silver	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
Sodium		--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--
Thallium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	47.4	54.4	82.5	54.4	48.1	44.7	65.6	53.7	38.9	36.2	59.6	47.8	44.8	44.5	51	37.8	41.9	46.4
Zinc	60.5	35.8	305	291	108	73.5	97.8	136	70.7	48.5	95.7	125 J	93.1 J	99.5 J	147 J	246 J	197 J	140 J
Volatile Organic Compounds (µg/kg)																		
4-methyl-2-pentanone		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Acetone	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--
Toluene	0.8 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Semivolatile Organic Compounds (µg/kg)																		
Benzo(a)anthracene	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--	NA	NA	NA	NA
Benzo(a)pyrene	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--	NA	NA	NA	NA
Benzo(b)fluoranthene	-	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--	NA	NA	NA	NA
Benzo(k)fluoranthene	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--	NA	NA	NA	NA
Chrysene	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--	NA	NA	NA	NA
Fluoranthene	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--	NA	NA	NA	NA
Phenanthrene	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--	NA	NA	NA	NA
Phenol	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--	NA	NA	NA	NA
Pyrene	340	350	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	350	400	NA	NA	NA	NA
Total PAHS	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--	NA	NA	NA	NA
Pesticides/PCBs																		
4,4'-DDE	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--	NA	NA	NA	NA
4,4'-DDT	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--	NA	NA	NA	NA
Aldrin	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--	NA	NA	NA	NA
Alpha-chlordane	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--	NA	NA	NA	NA
Aroclor-1248	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--	NA	NA	NA	NA
Aroclor-1254	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--	NA	NA	NA	NA
Dieldrin	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--	NA	NA	NA	NA
Gamma-chlordane	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--	NA	NA	NA	NA

Notes:
-- = not detected
J = estimated concentration
NA = not analyzed
DL = detection limit
µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram

TABLE 9

CONTAMINANTS OF POTENTIAL ECOLOGICAL CONCERN AND STATISTICAL SUMMARY FOR SOIL ANALYSES
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Analyte	Number of Detections/ Analyses	Maximum Detected Concentration (mg/kg)	Mean Detected Concentration[a] (mg/kg)	Median Detected Concentration (mg/kg)	UCL_{95} of Detected Concentration (mg/kg)	Number of Samples with Concentrations Greater than Ambient (mg/kg)	Concord Inland Areas Ambient Value[b] (mg/kg)	COPEC (yes/no)
Metals								
Aluminum	61 / 61	32,700	16,300	15,100	21,250	13 / 61	20,000	Yes
Antimony	16 / 61	21.6	3.12	2.25	1.48	12 / 61	1.2	Yes
Arsenic	60 / 61	287	49.1	35.7	91.5	52 / 61	7.3	Yes
Barium	60 / 61	338	155.2	152.5	207.8	3 / 61	210	Yes
Beryllium	3 / 61	0.34	0.2	0.2	0.34	0 / 61	0.56	No
Cadmium	55 / 61	64.9	10.76	6.4	34.2	55 / 61	0.15	Yes
Chromium	61 / 61	138	50.4	39	56	17 / 61	55	Yes
Cobalt	58 / 61	38.9	11.9	10.3	19.5	4 / 61	24	Yes
Copper	59 / 61	336	58.9	29.3	76.2	15 / 61	64	Yes
Lead	61 / 61	11,400	325	18.1	186.6	31 / 61	18	Yes
Manganese	59 / 59	1,360	375.7	326	468	6 / 59	870	Yes
Mercury	15 / 61	113	14.5	1.7	6.76	14 / 61	0.14	Yes
Molybdenum	15 / 61	10.4	3.85	3	1.5	15 / 61	DL	Yes
Nickel	59 / 61	61	26.1	22.3	33.7	0 / 61	86	No
Selenium	49 / 61	875	28.6	2.6	16.7	49 / 61	DL	Yes
Silver	5 / 61	10.4	3.4	1.5	0.65	5 / 61	DL	Yes
Thallium	2 / 61	1.4	1.3	1.3	1.4	2 / 61	DL	Yes
Vanadium	61 / 61	220	61.7	53.7	68.9	7 / 61	86	Yes
Zinc	61 / 61	1,010	167.7	125	197.8	47 / 61	83	Yes
Semivolatile Organic Compounds								
Benzo(a)anthracene	2/26	0.076	0.076	0.076	0.076	NA	NA	Yes
Benzo(a)pyrene	2/26	0.054	0.053	0.053	0.054	NA	NA	Yes
Benzo(b)fluoranthene	2/26	0.087	0.083	0.083	0.087	NA	NA	Yes
Benzo(k)fluoranthene	1/26	0.048	0.048	0.048	0.048	NA	NA	Yes
Chrysene	2/26	0.086	0.086	0.086	0.086	NA	NA	Yes
Fluoranthene	3/26	0.23	0.13	0.13	0.23	NA	NA	Yes
Phenanthrene	2/26	0.12	0.10	0.10	0.12	NA	NA	Yes
Phenol	2/26	1.6	1.1	1.1	1.6	NA	NA	Yes
Pyrene	2/13	0.19	0.15	0.15	0.19	NA	NA	Yes
Total HMW PAHs	6/52	1.6	1.4	1.5	1.6	NA	NA	Yes
Total LMW PAHs	4/52	1.3	1.2	1.2	1.3	NA	NA	Yes
Total PAHs	3/26	3.0	2.7	2.7	3	NA	NA	Yes
Pesticides								
4,4'-DDE	2/20	0.003	0.003	0.003	0.003	NA	NA	Yes
4,4'-DDT	6/20	0.012	0.007	0.007	0.005	NA	NA	Yes
Aldrin	2/20	0.003	0.002	0.002	0.003	NA	NA	Yes
alpha-Chlordane	1/20	0.002	0.002	0.002	0.002	NA	NA	Yes
Dieldrin	5/20	0.004	0.003	0.003	0.003	NA	NA	Yes
gamma-Chlordane	5/20	0.003	0.002	0.002	0.002	NA	NA	Yes
Total Chlordanes	5/20	0.005	0.003	0.003	0.005	NA	NA	Yes
Total DDTs	6/20	0.016	0.01	0.01	0.016	NA	NA	Yes
Polychlorinated Biphenyls								
Aroclor-1248	2/20	0.04	0.03	0.03	0.04	NA	NA	Yes
Aroclor-1254	1/20	0.06	0.06	0.06	0.06	NA	NA	Yes
Total PCBs	3/20	0.2	0.18	0.17	0.2	NA	NA	Yes

Notes: Concentrations are reported in milligrams per kilogram (mg/kg)
"R" aqualified data (rejected results) were excluded from the statistical summary.

DL Molybdenum, selenium, silver, and thallium were not detected in the ambient data set; Therefore, any detection of these metals is considered above ambient.
COPEC Chemical of potential ecological concern
NA Not applicable
HMW PAH High molecular weight polycyclic aromatic hydrocarbons (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, flouranthrene, and pyrene)
LMW PAH Low molecular weight polycyclic aromatic hydrocarbons (phenanthrene)
UCL_{95} One-sided 95 percent upper confidence limit of arithmetic mean
For compounds with 3 or fewer detections, the maximum detected concentration is considered the 95UCL
For compounds with a detection frequency of less than 40 percent, the bootstrapping procedure (Singh and others, 1997) was used to calculate a 95UCL value
a A numerical value of one-half of the detection limit was substituted for non-detects in statistical calculations.
b Estimated ambient metal concentrations in Concord Inland Area (PRC 1996b).

TABLE 10

COMPARISON OF AREA OF CONCERN 1 SOIL CONCENTRATIONS WITH TOXICOLOGICAL BENCHMARKS FOR PLANTS PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

COPEC	Toxicity Benchmark (mg/kg) Plant ORNLs[a]	Number of Samples Exceeding Benchmark	Soil Concentration (mg/kg) Minimum	Maximum	95UCL	Concord Inland Areas Ambient Value
Aluminum	50	61/61	349	32,700	21,250	20,000
Antimony	---	---	0.3	21.6	1.48	1.2
Arsenic	10	47/61	2.8	287	91.5	7.3
Barium	500	0/61	15.1	338	207.8	210
Beryllium	10	0/61	0.046	0.34	0.34	0.56
Cadmium	4	40/61	0.86	64.9	34.2	0.15
Chromium	1	61/61	22.2	138	56	55
Cobalt	20	7/61	2.9	38.9	19.5	24
Copper	100	10/61	13.3	336	76.2	64
Lead	50	12/61	1.9	11,400	186.6	18
Manganese	500	11/61	29.6	1,360	468	870
Mercury	0.3	14/61	0.1	113	6.76	0.14
Molybdenum	2	11/61	1.3	10.4	1.5	---
Selenium	100	2/61	0.42	875	16.7	---
Silver	2	2/61	0.67	10.4	0.65	---
Vanadium	2	61/61	7	220	68.9	86
Zinc	50	56/61	20.7	1,010	197.8	83

Notes:

mg/kg Milligrams per kilogram
ORNL Oak Ridge National Laboratory
UCL_{95} 95 percent upper confidence limit of available soil concentrations
--- No value exists or not applicable.

a From Efroymson and others 1997a

TABLE 11

COMPARISON OF AREA OF CONCERN 1 SOIL CONCENTRATIONS WITH TOXICOLOGICAL BENCHMARKS FOR INVERTEBRATES

PRELMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

	Toxicity Benchmark (mg/kg)		Soil Concentration (mg/kg)			
COPEC	Earthworm ORNLs[a] (mg/kg soil)	Number of Samples Exceeding Benchmark	Minimum	Maximum	95UCL	Concord Inland Areas Ambient Value
Aluminum	---	---	349	32,700	21,250	20,000
Antimony	---	---	0.3	21.6	1.48	1.2
Arsenic	60	19/61	2.8	287	91.5	7.3
Barium	---	---	15.1	338	207.8	210
Beryllium	---	---	0.046	0.34	0.34	0.56
Cadmium	20	7/61	0.86	64.9	34.2	0.15
Chromium	0.4	61/61	22.2	138	56	55
Cobalt	---	---	2.9	38.9	19.5	24
Copper	50	19/61	13.3	336	76.2	64
Lead	500	4/61	1.9	11,400	186.6	18
Manganese	---	---	29.6	1,360	468	870
Mercury	---	---	0.1	113	6.76	0.14
Molybdenum	---	---	1.3	10.4	1.5	---
Nickel	200	0/61	3.2	60.8	33.7	86
Vanadium	---	---	0.42	875	68.9	86
Zinc	200	14/61	0.67	1010	197.8	83

Notes:

mg/kg Milligrams per kilogram

ORNL Oak Ridge National Laboratory

UCL_{95} 95 percent upper confidence limit of available soil concentrations

--- No value exists or not applicable.

a Efroymson and others, 1997b

TABLE 12

SUMMARY OF LITERATURE-DERIVED BIOACCUMULATION FACTORS PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

(Page 1 of 2)

Analyte	Soil Invertebrate BAF (mg wet tissue/kg dry soil)[a]	Plant BAF (mg wet tissue/kg dry soil)[a]	Small Rodent BAF (mg wet tissue/kg dry soil)[a,b]
Aluminum	0.22	0.004	6.5×10^{-6} [c]
Antimony	0.22	0.20	0.0006
Arsenic	0.11	0.04	0.0012
Barium	0.22	0.15	0.00009
Cadmium	0.22	0.36	0.00007
Chromium	0.96	0.008	0.003
Cobalt	0.11[c]	0.22[c]	6.5×10^{-6} [c]
Copper	0.04	0.40	0.34
Lead	0.03	0.05	0.0001
Manganese	0.11[c]	0.07	6.5×10^{-6} [c]
Mercury	0.04	0.04	0.003
Molybdenum	1.00[d]	1.00[d]	6.5×10^{-6} [c]
Selenium	0.22	0.02	0.001
Silver	0.22[c]	0.40	0.002
Thallium	0.22[c]	0.004	0.024
Vanadium	0.11[c]	0.22[c]	6.5×10^{-6} [c]
Zinc	0.56	1.2×10^{-12}	5.4×10^{-5}
Total DDTs	8.4[d]	8.4[d]	0.027
4,4'-DDT	8.4[d]	8.4[d]	0.027
4,4'-DDE	1.26	0.009	0.027
Benzo(a)pyrene	0.01	0.07	0.02
Benzo(a)anthracene	0.02	0.03	0.07
Benzo(b)fluoranthene	0.01	0.07	0.24
Benzo(k)fluoranthene	0.01	0.08	0.24
Chrysene	0.02	0.04	0.08
Dibenzo(a,h)anthracene	0.006	0.07	0.05
Indeno(1,2,3-cd)pyrene	0.004	0.08	0.12
LMW PAHs	6.00[e]	0.32[e]	6.00[e]
HMW PAHs	0.01[f]	0.07[f]	0.02[f]
Aldrin	350[g]	350[g]	350[g]
Dieldrin	700[g]	700[g]	700[g]
Phenol	1,034[g]	0.05[g]	0.002[g]
Arochlor 1016	0.01	1.13	0.003
Arochlor 1254	0.01	1.13	0.02
Total PCBs	0.01[c]	1.13[c]	0.02[c]
Heptachlor	0.05	1.40	0.002
Total chlordanes	0.05[c]	1.40[c]	0.002[c]

TABLE 12

SUMMARY OF LITERATURE-DERIVED BIOACCUMULATION FACTORS PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

(Page 2 of 2)

Notes:

BAF Bioaccumulation factors
LMW Low molecular weight
HMW High molecular weight
PAH Polynuclear aromatic hydrocarbon
K_{ow} Octanol-water partition coefficient

[a] Factors obtained from EPA (1999) unless otherwise noted.

[b] BAFs based on exposure to herbivorous mammal (deer mouse).

[c] Empirical BAFs for these compounds were not available. As described in EPA (1999), the recommended BAF is the arithmetic mean of the recommended values for those organics with empirical data available (arsenic, cadmium, chromium, copper, lead, inorganic mercury, nickel, and zinc).

[d] BAFs based on earthworm data obtained from Sample and Arenal (1996).

[e] BAFs for LMW PAHs for both invertebrates and small rodents were based on recommended BAF for phenanthrene (EPA 1999). For plants, BAF for LMW PAH was based on the following empirical equation used to calculate recommended BAFs for PAHs: $\log BAF = 1.588 - 0.578 * \log K_{ow}$ (EPA 1999).

[f] BAF for HMW PAHs was based on recommended BAF for benzo(a)pyrene (EPA 1999).

[g] BAFs obtained from EPA's list of potentially bioaccumulative compounds (EPA 1998).

TABLE 13

SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT FOOD-CHAIN MODEL FOR THE WESTERN MEADOWLARK
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

COPEC	Total Ingestion Rate (kg/day)	Soil Ingestion Rate (kg/day)	Soil Concentration (mg/kg)	Soil Daily Dose (mg/day)	Total Prey Ingestion Rate (kg/day)	Plant Concentration Dry Weight (mg/kg)	Plant Ingestion Rate (kg/day)	Plant Daily Dose (mg/day)	Invertebrate Concentration Wet Weight (mg/kg)	Invertebrate Concentration Dry Weight (mg/kg)	Invertebrate Ingestion Rate (kg/day)	Invertebrate Daily Dose (mg/day)	SUF	Body Weight (kg)	Total Daily Dose (mg/kg/day)	TRV (mg/kg/day)	Test Species Body Weight (kg)	Allometrically Adjusted TRV (mg/kg/day)	HQ (based on adjusted TRV)
Aluminum																			
Dose/High TRV	0.017	1.68E-06	32700	5.50E-02	0.017	130.80	0.0062	0.81	7,194.00	47960.00	0.011	528.34	1.00	0.098	5,212.51	NA	NA	NA	No TRV
Dose/Low TRV	0.017	1.68E-06	32700	5.50E-02	0.017	130.80	0.0062	0.81	7,194.00	47960.00	0.011	528.34	1.00	0.098	5,212.51	NA	NA	NA	No TRV
Antimony																			
Dose/High TRV	0.017	1.68E-06	21.60	3.63E-05	0.017	4.32	0.0062	0.027	4.75	31.68	0.011	0.34	1.00	0.098	3.71	NA	NA	NA	No TRV
Dose/Low TRV	0.017	1.68E-06	21.60	3.63E-05	0.017	4.32	0.0062	0.027	4.75	31.68	0.011	0.34	1.00	0.098	3.71	NA	NA	NA	No TRV
Arsenic																			
Dose/High TRV	0.017	1.68E-06	287	4.83E-04	0.017	18.32	0.0062	0.11	31.57	210.47	0.011	2.23	1.00	0.098	24.01	22.01	1.17	13.39	1.79
Dose/Low TRV	0.017	1.68E-06	287	4.83E-04	0.017	18.32	0.0062	0.11	31.57	210.47	0.011	2.23	1.00	0.098	24.01	5.50	1.17	3.35	7.18
Barium																			
Dose/High TRV	0.017	1.68E-06	338	5.69E-04	0.017	50.70	0.0062	0.32	74.36	495.73	0.011	5.25	1.00	0.098	57.02	NA	NA	NA	No TRV
Dose/Low TRV	0.017	1.68E-06	338	5.69E-04	0.017	50.70	0.0062	0.32	74.36	495.73	0.011	5.25	1.00	0.098	57.02	NA	NA	NA	No TRV
Cadmium																			
Dose/High TRV	0.017	1.68E-06	64.90	1.09E-04	0.017	60.52	0.0062	0.38	62.30	415.36	0.011	4.40	1.00	0.098	48.92	10.43	0.084	2.08	582.42
Dose/Low TRV	0.017	1.68E-06	64.90	1.09E-04	0.017	60.52	0.0062	0.38	62.30	415.36	0.011	4.40	1.00	0.098	48.92	0.080	0.80	0.053	930.91
Chromium																			
Dose/High TRV	0.017	1.68E-06	138	2.32E-04	0.017	1.04	0.0062	0.0064	1.38	9.20	0.011	0.10	1.00	0.098	1.07	NA	NA	NA	No TRV
Dose/Low TRV	0.017	1.68E-06	138	2.32E-04	0.017	1.04	0.0062	0.0064	1.38	9.20	0.011	0.10	1.00	0.098	1.07	NA	NA	NA	No TRV
Cobalt																			
Dose/High TRV	0.017	1.68E-06	38.90	6.55E-05	0.017	4.67	0.0062	0.029	8.56	57.05	0.011	0.60	1.00	0.098	6.43	NA	NA	NA	No TRV
Dose/Low TRV	0.017	1.68E-06	38.90	6.55E-05	0.017	4.67	0.0062	0.029	8.56	57.05	0.011	0.60	1.00	0.098	6.43	NA	NA	NA	No TRV
Copper																			
Dose/High TRV	0.017	1.68E-06	336	5.65E-04	0.017	31.39	0.0062	0.20	13.44	89.60	0.011	0.95	1.00	0.098	11.73	52.25	0.41	39.35	0.30
Dose/Low TRV	0.017	1.68E-06	336	5.65E-04	0.017	31.39	0.0062	0.20	13.44	89.60	0.011	0.95	1.00	0.098	11.73	2.30	0.64	1.58	7.42
Lead																			
Dose/High TRV	0.017	1.68E-06	11400	1.92E-02	0.017	63.75	0.0062	0.40	342.00	2280.00	0.011	24.17	1.00	0.098	251.54	5.75	0.80	5.75	43.79
Dose/Low TRV	0.017	1.68E-06	11400	1.92E-02	0.017	63.75	0.0062	0.40	342.00	2280.00	0.011	24.17	1.00	0.098	251.54	0.014	0.084	0.014	17439.04
Manganese																			
Dose/High TRV	0.017	1.68E-06	1360	2.29E-03	0.017	163.22	0.0062	1.02	299.20	1994.67	0.011	21.14	1.00	0.098	226.84	756.00	0.20	674.79	0.34
Dose/Low TRV	0.017	1.68E-06	1360	2.29E-03	0.017	163.22	0.0062	1.02	299.20	1994.67	0.011	21.14	1.00	0.098	226.84	77.60	0.20	67.48	3.36
Mercury																			
Dose/High TRV	0.017	1.68E-06	113	1.90E-04	0.017	3.62	0.0062	0.023	4.52	30.13	0.011	0.32	1.00	0.098	3.50	0.18	1.00	0.11	30.98
Dose/Low TRV	0.017	1.68E-06	113	1.90E-04	0.017	3.62	0.0062	0.023	4.52	30.13	0.011	0.32	1.00	0.098	3.50	0.039	1.00	0.024	142.97
Molybdenum																			
Dose/High TRV	0.017	1.68E-06	10.40	1.75E-05	0.017	1.25	0.0062	0.0078	10.40	69.33	0.011	0.73	1.00	0.098	7.60	NA	NA	NA	No TRV
Dose/Low TRV	0.017	1.68E-06	10.40	1.75E-05	0.017	1.25	0.0062	0.0078	10.40	69.33	0.011	0.73	1.00	0.098	7.60	NA	NA	NA	No TRV
Selenium																			
Dose/High TRV	0.017	1.68E-06	875	1.47E-03	0.017	158.00	0.0062	0.98	192.50	1283.33	0.011	13.62	1.00	0.098	149.32	0.93	1.11	0.57	260.95
Dose/Low TRV	0.017	1.68E-06	875	1.47E-03	0.017	158.00	0.0062	0.98	192.50	1283.33	0.011	13.62	1.00	0.098	149.32	0.23	1.11	0.14	1055.13
Silver																			
Dose/High TRV	0.017	1.68E-06	10.40	1.75E-05	0.017	4.16	0.0062	0.026	2.29	15.25	0.011	0.16	1.00	0.098	1.92	NA	NA	NA	No TRV
Dose/Low TRV	0.017	1.68E-06	10.40	1.75E-05	0.017	4.16	0.0062	0.026	2.29	15.25	0.011	0.16	1.00	0.098	1.92	NA	NA	NA	No TRV
Thallium																			
Dose/High TRV	0.017	1.68E-06	1.40	2.36E-06	0.017	0.0055	0.0062	3.49E-05	0.31	2.05	0.011	0.022	1.00	0.098	0.22	NA	NA	NA	No TRV
Dose/Low TRV	0.017	1.68E-06	1.40	2.36E-06	0.017	0.0055	0.0062	3.49E-05	0.31	2.05	0.011	0.022	1.00	0.098	0.22	NA	NA	NA	No TRV
Vanadium																			
Dose/High TRV	0.017	1.68E-06	220	3.70E-04	0.017	25.40	0.0062	0.16	48.40	322.57	0.011	3.42	1.00	0.098	36.70	NA	NA	NA	No TRV
Dose/Low TRV	0.017	1.68E-06	220	3.70E-04	0.017	25.40	0.0062	0.16	48.40	322.57	0.011	3.42	1.00	0.098	36.70	NA	NA	NA	No TRV
Zinc																			
Dose/High TRV	0.017	1.68E-06	1010	1.70E-03	0.017	384.90	0.0062	2.40	565.60	3770.67	0.011	39.97	1.00	0.098	433.66	172.00	0.96	109.02	3.98
Dose/Low TRV	0.017	1.68E-06	1010	1.70E-03	0.017	384.90	0.0062	2.40	565.60	3770.67	0.011	39.97	1.00	0.098	433.66	17.20	0.96	10.90	39.78
HMW PAH																			
Dose/High TRV	0.017	1.68E-06	1.60	2.59E-06	0.017	0.018	0.0062	0.00011	0.11	0.75	0.011	0.0079	1.00	0.098	0.082	NA	NA	NA	No TRV
Dose/Low TRV	0.017	1.68E-06	1.60	2.59E-06	0.017	0.018	0.0062	0.00011	0.11	0.75	0.011	0.0079	1.00	0.098	0.082	NA	NA	NA	No TRV
LMW PAH																			
Dose/High TRV	0.017	1.68E-06	1.30	2.19E-06	0.017	0.42	0.0062	0.0026	7.80	52.00	0.011	0.55	1.00	0.098	5.67	NA	NA	NA	No TRV
Dose/Low TRV	0.017	1.68E-06	1.30	2.19E-06	0.017	0.42	0.0062	0.0026	7.80	52.00	0.011	0.55	1.00	0.098	5.67	NA	NA	NA	No TRV
Phenol																			
Dose/High TRV	0.017	1.68E-06	1.60	2.69E-06	0.017	0.080	0.0062	4.98E-04	1654.40	11029.33	0.011	116.91	1.00	0.098	1,196.68	NA	NA	NA	No TRV
Dose/Low TRV	0.017	1.68E-06	1.60	2.69E-06	0.017	0.080	0.0062	4.98E-04	1654.40	11029.33	0.011	116.91	1.00	0.098	1,196.68	NA	NA	NA	No TRV
DDEs																			
Dose/High TRV	0.017	1.68E-06	0.0032	5.38E-09	0.017	3.00E-05	0.0062	1.87E-07	0.0040	0.027	0.011	0.0003	1.00	0.098	0.0029	0.60	1.00	0.38	0.0077
Dose/Low TRV	0.017	1.68E-06	0.0032	5.38E-09	0.017	3.00E-05	0.0062	1.87E-07	0.0040	0.027	0.011	0.0003	1.00	0.098	0.0029	NA	NA	NA	No TRV
DDTs																			
Dose/High TRV	0.017	1.68E-06	0.012	2.02E-08	0.017	1.12E-04	0.0062	7.00E-07	0.10	0.67	0.011	0.007	1.00	0.098	0.073	1.50	1.00	0.94	0.077
Dose/Low TRV	0.017	1.68E-06	0.012	2.02E-08	0.017	1.12E-04	0.0062	7.00E-07	0.10	0.67	0.011	0.007	1.00	0.098	0.073	NA	NA	NA	No TRV
Total DDTs																			
Dose/High TRV	0.017	1.68E-06	0.016	2.69E-08	0.017	1.50E-04	0.0062	9.33E-07	0.11	0.90	0.011	0.009	1.00	0.098	0.10	NA	NA	NA	No TRV
Dose/Low TRV	0.017	1.68E-06	0.016	2.69E-08	0.017	1.50E-04	0.0062	9.33E-07	0.11	0.90	0.011	0.009	1.00	0.098	0.10	0.0090	3.52	0.0044	22.10
Aldrin																			
Dose/High TRV	0.017	1.68E-06	0.0032	5.38E-09	0.017	1.12	0.0062	0.0070	1.12	7.47	0.011	0.079	1.00	0.098	0.88	NA	NA	NA	No TRV
Dose/Low TRV	0.017	1.68E-06	0.0032	5.38E-09	0.017	1.12	0.0062	0.0070	1.12	7.47	0.011	0.079	1.00	0.098	0.88	NA	NA	NA	No TRV
Dieldrin																			
Dose/High TRV	0.017	1.68E-06	0.0040	6.73E-09	0.017	2.80	0.0062	0.017	2.80	18.67	0.011	0.20	1.00	0.098	2.20	NA	NA	NA	No TRV
Dose/Low TRV	0.017	1.68E-06	0.0040	6.73E-09	0.017	2.80	0.0062	0.017	2.80	18.67	0.011	0.20	1.00	0.098	2.20	NA	NA	NA	No TRV
Total Chlordanes																			
Dose/High TRV	0.017	1.68E-06	0.0047	7.91E-09	0.017	2.30E-04	0.0062	1.43E-06	0.0066	0.044	0.011	0.00047	1.00	0.098	0.0048	NA	NA	NA	No TRV
Dose/Low TRV	0.017	1.68E-06	0.0047	7.91E-09	0.017	2.30E-04	0.0062	1.43E-06	0.0066	0.044	0.011	0.00047	1.00	0.098	0.0048	NA	NA	NA	No TRV
Total PCBs																			
Dose/High TRV	0.017	1.68E-06	0.22	3.37E-07	0.017	0.0020	0.0062	1.25E-05	0.23	1.51	0.011	0.016	1.00	0.098	0.16	1.27	1.72	0.72	0.23
Dose/Low TRV	0.017	1.68E-06	0.22	3.37E-07	0.017	0.0020	0.0062	1.25E-05	0.23	1.51	0.011	0.016	1.00	0.098	0.16	0.090	1.82	0.059	2.77

TABLE 13

SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT FOOD CHAIN MODEL FOR THE WESTERN MEADOWLARK PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD, CONCORD

Notes: Highlighted cells indicate HQs greater than 1.0.

kg/day	Kilogram per day
mg/day	Milligram per day
mg/kg	Milligram per kilogram
mg/kg/day	Milligram per kilogram per day
NA	Not applicable
HMW	High moleculear weight
LMW	Low molecular weight
SUF	Site use factor
TRV	Toxicity reference value

1 Total ingestion rate was calculated with body weight using the Nagy and others (1999) metabolic rate equation for passerines and the food requirement conversion for omnivores. The soil and prey ingestion rates are expressed as a percentage of the total ingestion rate.

2 Soil ingestion rate based on Western Meadowlark soil ingestion rate in EPA (1999). The soil ingestion rate is expressed as a 0.01 percent of the total ingestion rate.

3 Soil concentration equals the maximum of all site-collected soil samples.

4 Soil daily dose was calculated by multiplying the soil ingestion rate (see note 2) by soil concentration (see note 3).

5 Total prey ingestion rate was 99.99 percent of the total ingestion rate, based on the soil ingestion rate (see note 2). The prey was assumed to consist of 37 percent plant and 63 percent invertebrates.

6 Plant concentration equals the maximum of arsenic, cadmium, copper, lead, selenium, and zinc measured in all site-collected plant tissue samples. For all other chemicals, the recommended BAF in dry weight cited in EPA (1998, 1999) and Sample and Areanal (1999) multiplied by the maximum soil concentration was used.

7 Plant ingestion rate was calculated by multiplying the total prey ingestion rate (see note 5) by 0.37.

8 Plant daily dose was calculated by multiplying plant ingestion rate (see note 7) by the maximum plant concentration (see note 6).

9 Invertebrate concentration equals the maximum of arsenic, cadmium, copper, lead, selenium, and zinc measured in all site-collected invertebrate tissue samples. For all other chemicals, the maximum in site-collected soil multiplied by the recommended BAF in wet weight cited in EPA (1999) for invertebrate tissue samples was used.

10 Invertebrate concentrations were converted to dry weight using the formula: dry weight concentration = (wet weight concentration)/(1-percent moisture in media). Average percent moisture for earthworm tissue equals 85 percent (EPA 1993). Plant BAFs and site-collected concentrations were originally cited in dry weight.

11 Invertebrate ingestion rate was calculated by multiplying the total prey ingestion rate (see note 5) by 0.63.

12 Invertebrate daily dose was calculated by multiplying invertebrate ingestion rate (see note 11) by the maximum invertebrate concentration (see note 9).

13 Average weight of males and females from Dunning (1993).

14 Total daily dose is calculated using the following equation: total daily dose = (plant daily dose + invertebrate daily dose + soil daily dose)*SUF)/receptor species body weight.

15 The derivation of TRVs is described in EFA WEST (1998). These TRVs are adjusted to incorporate uncertainty factors.

16 Allometrically adjusted TRVs were calculated using the following equation: receptor species TRV = (test species TRV) x (test species body weight / receptor species body weight)$^{(1-1.2)}$.

17 The HQ was calculated using total daily dose / allometrically adjusted TRV.

18 Sufficient data are not available to derive a TRV. This chemical was evaluated qualitatively.

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TABLE 14

SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT FOOD CHAIN MODEL FOR THE NORTHERN HARRIER
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

COPEC	Total Ingestion Rate[1] (kg/day)	Soil Ingestion Rate[1,2] (kg/day)	Soil Concentration (mg/kg)[3]	Soil Daily Dose[4] (mg/day)	Prey Ingestion Rate[1,5] (kg/day)	Prey Concentration Wet Weight(mg/kg)[6]	Prey Concentration Dry Weight(mg/kg)[7]	Prey Daily Dose[8] (mg/day)	SUF[9]	Body Weight[10] (kg)	Total Daily Dose[11] (mg/kg/day)	TRV[12] (mg/kg/day)	Test Species Body Weight (kg)	Allometrically Adjusted TRV[13] (mg/kg/day)	HQ[14] (based on adjusted TRV)
Aluminum															
Dose/High TRV	0.037	2.58E-04	32700.00	8.44	0.037	0.21	0.66	0.024	1.00	0.44	19.20	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.037	2.58E-04	32700.00	8.44	0.037	0.21	0.66	0.024	1.00	0.44	19.20	NA	NA	NA	No TRV[15]
Antimony															
Dose/High TRV	0.037	2.58E-04	21.60	0.0056	0.037	1.40E-04	4.39E-04	1.61E-05	1.00	0.44	0.013	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.037	2.58E-04	21.60	0.0056	0.037	1.40E-04	4.39E-04	1.61E-05	1.00	0.44	0.013	NA	NA	NA	No TRV[15]
Arsenic															
Dose/High TRV	0.037	2.58E-04	287.00	0.074	0.037	0.45	1.44	0.053	1.00	0.44	0.29	22.01	1.17	18.10	0.016
Dose/Low TRV	0.037	2.58E-04	287.00	0.074	0.037	0.45	1.44	0.053	1.00	0.44	0.29	5.50	1.17	4.52	0.064
Barium															
Dose/High TRV	0.037	2.58E-04	336.00	0.087	0.037	0.0022	0.0069	0.00025	1.00	0.44	0.20	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.037	2.58E-04	336.00	0.087	0.037	0.0022	0.0069	0.00025	1.00	0.44	0.20	NA	NA	NA	No TRV[15]
Cadmium															
Dose/High TRV	0.037	2.58E-04	64.90	0.017	0.037	4.27	13.34	0.49	1.00	0.44	1.15	10.43	0.084	14.53	0.079
Dose/Low TRV	0.037	2.58E-04	64.90	0.017	0.037	4.27	13.34	0.49	1.00	0.44	1.15	0.080	0.80	0.071	16.13
Chromium															
Dose/High TRV	0.037	2.58E-04	138	0.035	0.037	8.97E-04	2.80E-03	1.03E-04	1.00	0.44	0.08	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.037	2.58E-04	138	0.035	0.037	8.97E-04	2.80E-03	1.03E-04	1.00	0.44	0.08	NA	NA	NA	No TRV[15]
Cobalt															
Dose/High TRV	0.037	2.58E-04	38.90	0.010	0.037	2.53E-04	7.90E-04	2.89E-05	1.00	0.44	0.023	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.037	2.58E-04	38.90	0.010	0.037	2.53E-04	7.90E-04	2.89E-05	1.00	0.44	0.023	NA	NA	NA	No TRV[15]
Copper															
Dose/High TRV	0.037	2.58E-04	336	0.087	0.037	52.40	163.75	6.06	1.00	0.44	13.79	52.26	0.41	53.05	0.26
Dose/Low TRV	0.037	2.58E-04	336	0.087	0.037	52.40	163.75	6.06	1.00	0.44	13.79	2.30	0.64	2.14	6.46
Lead															
Dose/High TRV	0.037	2.58E-04	11400	2.94	0.037	10.40	32.50	1.19	1.00	0.44	9.37	8.75	0.80	7.77	1.21
Dose/Low TRV	0.037	2.58E-04	11400	2.94	0.037	10.40	32.50	1.19	1.00	0.44	9.37	[illegible]	0.084	0.020	480.49
Manganese															
Dose/High TRV	0.037	2.58E-04	1360	0.35	0.037	8.84E-03	2.76E-02	1.01E-03	1.00	0.44	0.80	776.00	0.20	512.17	0.0088
Dose/Low TRV	0.037	2.58E-04	1360	0.35	0.037	8.84E-03	2.76E-02	1.01E-03	1.00	0.44	0.80	77.60	0.20	51.22	0.0088
Mercury															
Dose/High TRV	0.037	2.58E-04	113	0.029	0.037	0.010	0.031	0.0011	1.00	0.44	0.069	0.18	1.00	0.15	0.45
Dose/Low TRV	0.037	2.58E-04	113	0.029	0.037	0.010	0.031	0.0011	1.00	0.44	0.069	0.039	1.00	0.033	2.08
Molybdenum															
Dose/High TRV	0.037	2.58E-04	10.40	0.0027	0.037	6.76E-05	2.11E-04	7.74E-06	1.00	0.44	0.0061	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.037	2.58E-04	10.40	0.0027	0.037	6.76E-05	2.11E-04	7.74E-06	1.00	0.44	0.0061	NA	NA	NA	No TRV[15]
Selenium															
Dose/High TRV	0.037	2.58E-04	875	0.2259	0.037	16.90	52.81	1.97	1.00	0.44	4.90	0.93	1.11	0.77	6.33
Dose/Low TRV	0.037	2.58E-04	875	0.2259	0.037	16.90	52.81	1.97	1.00	0.44	4.90	0.23	1.11	0.19	25.60
Silver															
Dose/High TRV	0.037	2.58E-04	10.40	0.0027	0.037	6.76E-05	2.11E-04	7.74E-06	1.00	0.44	0.0061	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.037	2.58E-04	10.40	0.0027	0.037	6.76E-05	2.11E-04	7.74E-06	1.00	0.44	0.0061	NA	NA	NA	No TRV[15]
Thallium															
Dose/High TRV	0.037	2.58E-04	1.40	3.61E-04	0.037	9.10E-06	2.84E-05	1.04E-06	1.00	0.44	8.22E-04	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.037	2.58E-04	1.40	3.61E-04	0.037	9.10E-06	2.84E-05	1.04E-06	1.00	0.44	8.22E-04	NA	NA	NA	No TRV[15]
Vanadium															
Dose/High TRV	0.037	2.58E-04	220	0.057	0.037	0.0014	0.0045	0.00016	1.00	0.44	0.13	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.037	2.58E-04	220	0.057	0.037	0.0014	0.0045	0.00016	1.00	0.44	0.13	NA	NA	NA	No TRV[15]
Zinc															
Dose/High TRV	0.037	2.58E-04	1010	0.26	0.037	315.10	984.69	36.05	1.00	0.44	82.36	172.00	0.56	147.37	0.56
Dose/Low TRV	0.037	2.58E-04	1010	0.26	0.037	315.10	984.69	36.05	1.00	0.44	82.36	17.20	0.56	14.74	5.59
HMW PAH															
Dose/High TRV	0.037	2.58E-04	1.60	4.13E-04	0.037	1.04E-05	3.25E-05	1.19E-06	1.00	0.44	9.39E-04	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.037	2.58E-04	1.60	4.13E-04	0.037	1.04E-05	3.25E-05	1.19E-06	1.00	0.44	9.39E-04	NA	NA	NA	No TRV[15]
LMW PAH															
Dose/High TRV	0.037	2.58E-04	1.30	3.36E-04	0.037	8.45E-06	2.64E-05	9.67E-07	1.00	0.44	7.63E-04	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.037	2.58E-04	1.30	3.36E-04	0.037	8.45E-06	2.64E-05	9.67E-07	1.00	0.44	7.63E-04	NA	NA	NA	No TRV[15]
DDEs															
Dose/High TRV	0.037	2.58E-04	0.0032	8.26E-07	0.037	2.08E-08	6.50E-08	2.38E-09	1.00	0.44	1.88E-06	0.60	1.00	0.51	0.0000037
Dose/Low TRV	0.037	2.58E-04	0.0032	8.26E-07	0.037	2.08E-08	6.50E-08	2.38E-09	1.00	0.44	1.88E-06	NA	NA	NA	No TRV[15]
DDTs															
Dose/High TRV	0.037	2.58E-04	0.012	3.10E-06	0.037	7.80E-08	2.44E-07	8.93E-09	1.00	0.44	7.04E-06	1.50	1.00	1.27	0.0000055
Dose/Low TRV	0.037	2.58E-04	0.012	3.10E-06	0.037	7.80E-08	2.44E-07	8.93E-09	1.00	0.44	7.04E-06	NA	NA	NA	No TRV[15]
Total DDTs															
Dose/High TRV	0.037	2.58E-04	0.016	4.13E-06	0.037	1.04E-07	3.25E-07	1.19E-08	1.00	0.44	9.39E-06	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.037	2.58E-04	0.016	4.13E-06	0.037	1.04E-07	3.25E-07	1.19E-08	1.00	0.44	9.39E-06	0.0090	3.50	0.0059	0.0016
Aldrin															
Dose/High TRV	0.037	2.58E-04	0.0032	8.26E-07	0.037	2.08E-08	6.50E-08	2.38E-09	1.00	0.44	1.88E-06	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.037	2.58E-04	0.0032	8.26E-07	0.037	2.08E-08	6.50E-08	2.38E-09	1.00	0.44	1.88E-06	NA	NA	NA	No TRV[15]
Dieldrin															
Dose/High TRV	0.037	2.58E-04	0.0040	1.03E-06	0.037	2.60E-08	8.13E-08	2.98E-09	1.00	0.44	2.35E-06	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.037	2.58E-04	0.0040	1.03E-06	0.037	2.60E-08	8.13E-08	2.98E-09	1.00	0.44	2.35E-06	NA	NA	NA	No TRV[15]
Phenol															
Dose/High TRV	0.037	2.58E-04	1.60	4.13E-04	0.037	1.04E-05	3.25E-05	1.19E-06	1.00	0.44	9.39E-04	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.037	2.58E-04	1.60	4.13E-04	0.037	1.04E-05	3.25E-05	1.19E-06	1.00	0.44	9.39E-04	NA	NA	NA	No TRV[15]
Total Chlordanes															
Dose/High TRV	0.037	2.58E-04	0.0047	1.21E-06	0.037	3.06E-08	9.55E-08	3.50E-09	1.00	0.44	2.76E-06	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.037	2.58E-04	0.0047	1.21E-06	0.037	3.06E-08	9.55E-08	3.50E-09	1.00	0.44	2.76E-06	NA	NA	NA	No TRV[15]
Total PCBs															
Dose/High TRV	0.037	2.58E-04	0.20	5.16E-05	0.037	1.30E-06	4.06E-06	1.49E-07	1.00	0.44	1.17E-04	1.27	1.72	0.97	0.00012
Dose/Low TRV	0.037	2.58E-04	0.20	0.000052	0.037	1.30E-06	4.06E-06	1.49E-07	1.00	0.44	1.17E-04	0.090	0.80	0.080	0.0015

TABLE 14

SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT FOOD CHAIN MODEL FOR THE NORTHERN HARRIER PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD, CONCORD

Notes: Highlighted cells indicate HQs greater than 1.0.

COPEC	Chemical of potential ecological concern
HQ	Hazard quotient
kg	Kilogram
mg/kg	Milligram per kilogram
kg/day	Kilogram per day
mg/kg/day	Milligram per kilogram per day
NA	Not applicable
SUF	Site use factor
TRV	Toxicity reference value

1 Total ingestion rate was calculated with body weight using the Nagy and others (1999) metabolic rate equation for all birds and the food requirement conversion for insectivorous birds. Soil and prey ingestion rates are expressed as a percentage of the total ingestion rate.

2 Soil ingestion rate based on Bald Eagle soil ingestion rate in Pascoe and others (1996). The soil ingestion rate is expressed as a 0.7 percent of the total ingestion rate.

3 Soil concentration equals the maximum of all site-collected soil samples.

4 Soil daily dose was calculated by multiplying the soil ingestion rate (see note 2) by the maximum (see note 3) soil concentration.

5 Total prey ingestion rate was 99.3 percent of the total ingestion rate, based on the soil ingestion rate (see note 2). The prey was assumed to consist of 100 percent rodents.

6 Prey concentrations for arsenic, cadmium, copper, lead, mercury, selenium, and zinc were based on the summation of individual maximum metal concentrations measured in liver and kidney tissue of three rodent species (California vole, house mouse, deer mouse) collected from RASS 4. For all other chemicals, the recommended BAF in wet weight cited in EPA (1998, 1999) multiplied by the maximum soil concentration was used.

7 Rodent concentrations were converted to dry weight using the formula: dry weight concentration = (wet weight concentration)/(1-percent moisture in media). Average percent moisture for rodent tissue equals 68 percent (EPA 1993).

8 Prey daily dose was calculated by multiplying prey ingestion rate (see note 5) by maximum prey concentration (see note 6).

9 SUF was conservatively assumed to be 1.00.

10 Average weight of males and females from Dunning (1993).

11 Total daily dose is calculated using the following equation: [(prey daily dose + soil daily dose)*SUF] / receptor species body weight.

12 The derivation of TRVs is described in EFA WEST (1998). These TRVs are adjusted to incorporate uncertainty factors.

13 Allometrically adjusted TRVs were calculated using the following equation: receptor species TRV = (test species TRV) x (test species body weight / receptor species body weight)$^{(1-1.2)}$.

14 The HQ was calculated using total daily dose/allometrically adjusted TRV.

15 Sufficient data are not available to derive a TRV. This chemical was evaluated qualitatively.

TABLE 15

SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT FOOD CHAIN MODEL FOR THE GRAY FOX
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

COPEC	Total Ingestion Rate[1] (kg/day)	Soil Ingestion Rate[2] (kg/day)	Soil Concentration (mg/kg)[3]	Soil Daily Dose[4] (mg/day)	Prey Ingestion Rate[5] (kg/day)	Prey Concentration Wet Weight (mg/kg)[6]	Prey Concentration Dry Weight (mg/kg)[7]	Prey Daily Dose[8] (mg/day)	SUF[9]	Body Weight[10] (kg)	Total Daily Dose[11] (mg/kg/day)	TRV[12] (mg/kg/day)	Test Species Body Weight (kg)	Allometrically Adjusted TRV[13] (mg/kg/day)	HQ[14] - based on adjusted TRV)
Aluminum															
Dose/High TRV	0.18	0.0050	32,700	162.34	0.17	0.21	0.65	0.11	1.00	3.88	41.87	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.18	0.0050	32,700	162.34	0.17	0.21	0.65	0.11	1.00	3.88	41.87	NA	NA	NA	No TRV[15]
Antimony															
Dose/High TRV	0.18	0.0050	21.50	0.11	0.17	1.40E-04	4.39E-04	7.56E-05	1.00	3.88	0.028	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.18	0.0050	21.50	0.11	0.17	1.40E-04	4.39E-04	7.56E-05	1.00	3.88	0.028	NA	NA	NA	No TRV[15]
Arsenic															
Dose/High TRV	0.18	0.0050	287	1.42	0.17	0.46	1.44	0.25	1.00	3.88	0.43	4.70	0.11	3.80	0.11
Dose/Low TRV	0.18	0.0050	287	1.42	0.17	0.46	1.44	0.25	1.00	3.88	0.43	0.32	0.33	0.28	1.56
Barium															
Dose/High TRV	0.18	0.0050	338	1.68	0.17	0.0022	0.0069	0.0012	1.00	3.88	0.43	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.18	0.0050	338	1.68	0.17	0.0022	0.0069	0.0012	1.00	3.88	0.43	NA	NA	NA	No TRV[15]
Cadmium															
Dose/High TRV	0.18	0.0050	54.90	0.32	0.17	8.65	27.03	4.66	1.00	3.88	1.29	2.64	0.031	1.98	0.65
Dose/Low TRV	0.18	0.0050	54.90	0.32	0.17	8.65	27.03	4.66	1.00	3.88	1.29	0.050	0.032	0.045	28.5
Chromium															
Dose/High TRV	0.18	0.0050	118	0.59	0.17	5.97E-04	0.0028	4.83E-04	1.00	3.88	0.18	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.18	0.0050	118	0.59	0.17	5.97E-04	0.0028	4.83E-04	1.00	3.88	0.18	NA	NA	NA	No TRV[15]
Cobalt															
Dose/High TRV	0.18	0.0050	38.95	0.19	0.17	2.53E-04	7.90E-04	1.36E-04	1.00	3.88	0.050	20.00	0.20	16.7	0.0030
Dose/Low TRV	0.18	0.0050	38.95	0.19	0.17	2.53E-04	7.90E-04	1.36E-04	1.00	3.88	0.050	1.20	0.28	1.02	0.05
Copper															
Dose/High TRV	0.18	0.0050	336	1.67	0.17	87.10	272.19	45.91	1.00	3.88	12.52	631.58	0.025	466.29	0.027
Dose/Low TRV	0.18	0.0050	336	1.67	0.17	87.10	272.19	45.91	1.00	3.88	12.52	2.67	0.030	1.99	6.28
Lead															
Dose/High TRV	0.18	0.0050	11,400	55.63	0.17	78.70	245.94	42.39	1.00	3.88	25.51	240.64	0.19	174.72	0.15
Dose/Low TRV	0.18	0.0050	11,400	55.63	0.17	78.70	245.94	42.39	1.00	3.88	25.51	0.0015	0.21	0.0012	20,271
Manganese															
Dose/High TRV	0.18	0.0050	1,360	5.75	0.17	0.0088	0.028	0.0048	1.00	3.88	1.74	159.09	0.030	118.76	0.015
Dose/Low TRV	0.18	0.0050	1,360	5.75	0.17	0.0088	0.028	0.0048	1.00	3.88	1.74	13.70	0.035	10.32	0.17
Mercury															
Dose/High TRV	0.18	0.0050	113	0.56	0.17	0.010	0.031	0.0054	1.00	3.88	0.15	0.27	0.83	0.25	0.59
Dose/Low TRV	0.18	0.0050	113	0.56	0.17	0.010	0.031	0.0054	1.00	3.88	0.15	0.027	0.83	0.025	5.94
Molybdenum															
Dose/High TRV	0.18	0.0050	10.40	0.052	0.17	6.76E-05	2.11E-04	3.54E-05	1.00	3.88	0.013	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.18	0.0050	10.40	0.052	0.17	6.76E-05	2.11E-04	3.64E-05	1.00	3.88	0.013	NA	NA	NA	No TRV[15]
Selenium															
Dose/High TRV	0.18	0.0050	875	4.34	0.17	41.40	129.38	22.26	1.00	3.88	6.85	1.21	0.025	0.89	7.67
Dose/Low TRV	0.18	0.0050	875	4.34	0.17	41.40	129.38	22.26	1.00	3.88	6.85	0.057	0.19	0.042	164.47
Silver															
Dose/High TRV	0.18	0.0050	10.40	0.052	0.17	6.76E-05	2.11E-04	3.63E-05	1.00	3.88	0.013	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.18	0.0050	10.40	0.052	0.17	6.76E-05	2.11E-04	3.63E-05	1.00	3.88	0.013	NA	NA	NA	No TRV[15]
Thallium															
Dose/High TRV	0.18	0.0050	1.40	0.0069	0.17	9.10E-06	2.84E-05	4.89E-06	1.00	3.88	0.0018	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.18	0.0050	1.40	0.0069	0.17	9.10E-06	2.84E-05	4.89E-06	1.00	3.88	0.0018	NA	NA	NA	No TRV[15]
Vanadium															
Dose/High TRV	0.18	0.0050	220	1.09	0.17	0.0014	0.0045	2.70E-04	1.00	3.88	0.28	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.18	0.0050	220	1.09	0.17	0.0014	0.0045	2.70E-04	1.00	3.88	0.28	NA	NA	NA	No TRV[15]
Zinc															
Dose/High TRV	0.18	0.0050	1,010	5.01	0.17	1,508.50	4,714.06	812.44	1.00	3.88	210.69	411.43	0.18	341.62	0.62
Dose/Low TRV	0.18	0.0050	1,010	5.01	0.17	1,508.50	4,714.06	812.44	1.00	3.88	210.69	9.60	0.026	7.10	29.67
HMW PAH															
Dose/High TRV	0.18	0.0050	1.50	0.0079	0.17	1.04E-05	3.25E-05	5.60E-06	1.00	3.88	0.0020	32.79	0.031	24.52	8.36E-05
Dose/Low TRV	0.18	0.0050	1.50	0.0079	0.17	1.04E-05	3.25E-05	5.60E-06	1.00	3.88	0.0020	1.31	0.031	0.98	2.09E-03
LMW PAH															
Dose/High TRV	0.18	0.0050	1.30	0.0065	0.17	8.45E-06	2.64E-05	4.55E-06	1.00	3.88	0.0017	150.00	0.27	127.84	1.30E-05
Dose/Low TRV	0.18	0.0050	1.30	0.0065	0.17	8.45E-06	2.64E-05	4.55E-06	1.00	3.88	0.0017	50.00	0.28	42.67	3.90E-05
DDTs															
Dose/High TRV	0.18	0.0050	0.012	5.96E-05	0.17	7.80E-08	2.44E-07	4.20E-08	1.00	3.88	1.54E-05	16.00	0.32	13.78	1.12E-06
Dose/Low TRV	0.18	0.0050	0.012	5.96E-05	0.17	7.80E-08	2.44E-07	4.20E-08	1.00	3.88	1.54E-05	0.80	0.32	0.69	2.23E-05
Aldrin															
Dose/High TRV	0.18	0.0050	0.0030	1.49E-05	0.17	1.95E-08	6.09E-08	1.05E-08	1.00	3.88	3.84E-06	1.00	0.065	0.78	4.91E-06
Dose/Low TRV	0.18	0.0050	0.0030	1.49E-05	0.17	1.95E-08	6.09E-08	1.05E-08	1.00	3.88	3.84E-06	0.10	0.065	0.078	4.91E-05
Dieldrin															
Dose/High TRV	0.18	0.0050	0.0040	1.99E-05	0.17	2.60E-08	8.13E-08	1.40E-08	1.00	3.88	5.12E-06	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.18	0.0050	0.0040	1.99E-05	0.17	2.60E-08	8.13E-08	1.40E-08	1.00	3.88	5.12E-06	NA	NA	NA	No TRV[15]
Phenol															
Dose/High TRV	0.18	0.0050	1.60	0.0079	0.17	1.04E-05	3.25E-05	5.60E-06	1.00	3.88	0.0020	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.18	0.0050	1.60	0.0079	0.17	1.04E-05	3.25E-05	5.60E-06	1.00	3.88	0.0020	NA	NA	NA	No TRV[15]
Total Chlordanes															
Dose/High TRV	0.18	0.0050	0.0047	2.33E-05	0.17	3.06E-08	9.55E-08	1.65E-08	1.00	3.88	6.02E-06	NA	NA	NA	No TRV[15]
Dose/Low TRV	0.18	0.0050	0.0047	2.33E-05	0.17	3.06E-08	9.55E-08	1.65E-08	1.00	3.88	6.02E-06	NA	NA	NA	No TRV[15]
Total PCBs															
Dose/High TRV	0.18	0.0050	0.20	0.0010	0.17	1.30E-06	4.06E-06	7.00E-07	1.00	3.88	2.56E-04	1.28	0.023	0.94	2.72E-04
Dose/Low TRV	0.18	0.0050	0.20	0.0010	0.17	1.30E-06	4.06E-06	7.00E-07	1.00	3.88	2.56E-04	0.36	0.021	0.25	0.0010

TABLE 15

SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT FOOD CHAIN MODEL FOR THE GRAY FOX
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD, CONCORD

Notes:

COPEC	Chemical of potential ecological concern
HQ	Hazard quotient
kg	Kilogram
mg/kg	Milligram per kilogram
kg/day	Kilogram per day
mg/kg/day	Milligram per kilogram per day
NA	Not applicable
SUF	Site use factor
TRV	Toxicity reference value

1 Total ingestion rate was calculated with body weight using the Nagy and others (1999) metabolic rate equation for eutherian mammals and the food requirement conversion for omnivores. Soil and prey ingestion rates are expressed as a percentage of the total ingestion rate.

2 Soil ingestion rate based on red fox soil ingestion rate in Beyer and others (1994). The soil ingestion rate is expressed as a 2.8 percent of the total ingestion rate.

3 Soil concentration equals the maximum of all site-collected soil samples.

4 Soil daily dose was calculated by multiplying the soil ingestion rate (see note 2) by the maximum (see note 3) soil concentration.

5 Total prey ingestion rate was 97.2 percent of the total ingestion rate, based on the soil ingestion rate (see note 2). The prey was assumed to consist of 100 percent rodents.

6 Prey concentrations for arsenic, cadmium, copper, lead, mercury, selenium, and zinc were based on the summation of individual maximum metal concentrations measured in femur, liver, and kidney tissue of three rodent species collected from RASS 4. Prey concentrations for other COPECs are recommended values derived from bioaccumulation factors published by EPA (1999) multplied by the maximum soil concentration.

7 Rodent concentrations were converted to dry weight using the formula: dry weight concentration = (wet weight concentration)/(1-percent moisture in media). Average percent moisture for rodent tissue equals 68 percent (EPA 1993).

8 Prey daily dose was calculated by multiplying prey ingestion rate (see note 5) by maximum prey concentration (see note 6).

9 SUF was conservatively assumed to be 1.00.

10 Average adult weight from EPA (1993) and Silva and Downing (1995).

11 Total daily dose is calculated using the following equation: [(prey daily dose + soil daily dose)*SUF] / receptor species body weight.

12 The derivation of TRVs is described in EFA WEST (1998). These TRVs are adjusted to incorporate uncertainty factors.

13 Allometrically adjusted TRVs were calculated using the following equation: receptor species TRV = (test species TRV) x (test species body weight / receptor species body weight)$^{(1-0.94)}$.

14 The HQ was calculated using total daily dose/allometrically adjusted TRV.

15 Sufficient data are not available to derive a TRV. This chemical was evaluated qualitatively.

TABLE 16

QUALITATIVE EVALUATION OF CHEMICALS OF POTENTIAL ECOLOGICAL CONCERN WITHOUT AVIAN TOXICITY REFERENCE VALUES
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Receptor	Study	Effect Type	Test Species (Body Weight)	Dose to Test Species (mg/kg-day)	Allometrically Converted Dose (mg/kg-day)	Food-chain Modeled Maximum Dose (mg/kg-day)	Does the Food-chain Modeled Dose Exceed Literature Doses?
Chromium							
Meadowlark	Rosomer and Others 1961	No effect	Chicken (800 g)	100	65.67	4.69	No
	Haseltine and Others 1985	No effect	Black Duck (1,172 g)	50	30.42		
Northern Harrier	Rosomer and Others 1961	No effect	Chicken (800 g)	100	88.77	0.20	No
	Haseltine and Others 1985	No effect	Black Duck (1,172 g)	50	41.12		
Molybdenum							
Meadowlark	Kratzer 1952	Growth rate, hemoglobin effects	S.C. Leghorn Chickens (160 g)	8.87	8.04	2.95	No
	Kratzer 1952	Growth rate, hemoglobin effects	Bronze poult (251 g)	7.78	6.44		
Northern Harrier	Kratzer 1952	Growth rate, hemoglobin effects	S.C. Leghorn Chickens (160 g)	8.87	10.86	< 0.01	No
	Kratzer 1952	Growth rate, hemoglobin effects	Bronze poult (251 g)	7.78	8.71		
Silver							
Meadowlark	Peterson and Jensen 1975a	No effects	Hubbard Broiler Chicks (211.2 g)	90.04	77.48	0.03	No
	Van Vleet and others 1981	Pathological alterations to intestine, skeletal muscle, and gizzard	White Peking Ducklings (123.7 g)	361.84	345.12		No
Northern Harrier	Peterson and Jensen 1975a	No effects	Hubbard Broiler Chicks (211.2 g)	90.04	104.32	0.01	No
	Van Vleet and others 1981	Pathological alterations to intestine, skeletal muscle. and gizzard	White Peking Ducklings (123.7 g)	361.84	466.58		No
Thallium							
Meadowlark	Shaw 1933	No effect	Domestic Mallards (1,172 grams)	20	12.17	< 0.01	No
	Bean and Judson 1976	No effect	Golden Eagles (2,800 grams)	60	10.22		
	Ward 1931	No effect	Mallard Ducks (1,083 grams)	35	21.63		
Northern Harrier	Shaw 1933	No effect	Domestic Mallards (1,172 grams)	20	16.4	0.01	No
	Bean and Judson 1976	No effect	Golden Eagles (2,800 grams)	60	41.4		
	Ward 1931	No effect	Mallard Ducks (1,083 grams)	35	29.2		
HMW PAHs							
Meadowlark	Bond and Others 1981	No effect	Chickens (3828 g)	0.10	0.05	0.06	No
	Penn and Snyder 1988	Increase in arterio-sclerotic plaques	White Leghorn Chickens (3822 g)	40.0	19.21		
Northern Harrier	Bond and Others 1981	No effect	Chickens (3828 g)	0.10	0.06	< 0.01	No
	Penn and Snyder 1988	Increase in arterio-sclerotic plaques	White Leghorn Chickens (3822 g)	40.0	25.97		

Notes:

HMW	High molecular weight
mg/kg-day	Milligram per kilogram body weight per day
PAH	Polynuclear aromatic hydrocarbon

TABLE 17

QUALITATIVE EVALUATION OF CHEMICALS OF POTENTIAL ECOLOGICAL CONCERN WITHOUT MAMMALIAN TOXICITY REFERENCE VALUES
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Receptor	Study	Effect Type	Dose to Test Species (mg/kg-day)	Test Species (Body Weight)	Allometrically Converted Dose (mg/kg-day)	Food-chain Modeled Maximum Dose (mg/kg-day)	Does the Food-chain Modeled Dose Exceed Literature Doses?
Aluminum							
Gray Fox	Gomez and Others 1986	No effect	195	Rat	NA	41.9	No
	Domingo and Others 1987	No effect	108	Rat	NA		
	Domingo and Others 1987	LOAEL (decreased weight gain)	540	Rat	NA		
Antimony							
Gray Fox	Schroeder and Others 1975a	No effect	5	Long-Evans rats (289.75 g)	4.28	0.03	No
	Dieter and Others 1991	No effect	168	F344/N Rats (124 g)	136.6	0.03	
Barium							
Gray Fox	McCauley and Others 1985	No effect	15	Rats	NA	0.43	No
	Tardiff and Others 1989	No effect	35	Rat	NA		
Chromium							
Gray Fox	Preston and Others 1976	No effect	50	Guinea pig (925 g)	65.16	0.20	No
Molybdenum							
Gray Fox	Rana and Prakash 1986	Induced collagenesis in the liver	1,000	Albino rats (100 g)	1,140.4	0.01	No
	Winston and Trainor 1978	No effect in serum glucose	0.2	Sprague-Dawley rats (365 g)	0.25		
Silver							
Gray Fox	Susic and Kentera 1986	Increased ventricular pressure	15	Rat (211 g)	12.60	0.02	No
	Mountain et al. 1953	Decreased weight gain	30	Rat (211 g)	25.19	0.02	No
Vanadium							
Gray Fox	Susic and Kentera 1986	Increased ventricular pressure	15	Rat (211 g)	1,7.89	0.28	No
	Mountain and Others 1953	Decreased weight gain	30	Rat (211 g)	3,5.78		
Total Chlordanes							
Gray Fox	Balash and Others 1987	No effect	100	Swiss mice	NA	< 0.01	No
	Kwasawinah and Grutsch 1989	No effect	0.18	Charles River mice	NA		
	Cranmer and Others 1984	No effect	8	F2 dihybrid mice	NA		

Notes:

g Gram
LOAEL Lowest observed adverse effects level
mg/kg-day Milligram per kilogram body weight per day
NA An allometrically converted dose could not be calculated if test species body weight was not identified.

TABLE 18

SUMMARY OF LITERATURE-DERIVED ABSORPTION COEFFICIENTS PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

Analyte	Recommended Value	Range
Arsenic	0.98	0.70-0.98
Cadmium	0.06	0.023-0.1
Copper	0.5	0.32-0.90
Lead	0.1	0.01-0.14
Selenium	0.6	0.44-1.00
Zinc	0.5	NS

Notes:

Recommended absorption coefficients are from Owen (1990).

NS - Not specified

TABLE 19

FOCUSED ASSESSMENT FOOD CHAIN MODEL FOR THE WESTERN MEADOWLARK PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

COPEC	Total Ingestion Rate[1] (kg/day)	Soil Ingestion Rate[1,2] (kg/day)	Soil Concentration[3] (mg/kg)	Soil Daily Dose[4] (mg/day)	Total Prey Ingestion Rate[1,5] (kg/day)	Plant Concentration Dry Weight (mg/kg)[6]	Tissue Bioavailability Factor	Plant Concentration Adjusted for Bioavailability	Plant Ingestion Rate[5,7] (kg/day)	Plant Daily Dose[8] (mg/day)	Invertebrate Concentration Wet Weight (mg/kg)[9]	Invertebrate Concentration Dry Weight (mg/kg)[10]	Tissue Bioavailability Factor	Invertebrate Concentration Adjusted for Bioavailability	Invertebrate Ingestion Rate[5,11] (kg/day)	Invertebrate Daily Dose[12] (mg/day)	SUF	Body Weight[13] (kg)	Total Daily Dose[14] (mg/kg/day)	TRV[15] (mg/kg/day)	Test Species Body Weight (kg)	Allometrically Adjusted TRV[16] (mg/kg/day)	HQ[17] (based on adjusted TRV)
Arsenic																							
Dose/High TRV	0.017	1.68E-06	91.52	1.54E-04	0.017	4.46	0.98	4.37	0.0062	0.027	10.07	67.11	0.98	65.77	0.011	0.70	1.00	0.098	7.42	22.01	1.17	13.39	0.55
Dose/Low TRV	0.017	1.68E-06	91.52	1.54E-04	0.017	4.46	0.98	4.37	0.0062	0.027	10.07	67.11	0.98	65.77	0.011	0.70	1.00	0.098	7.42	5.50	1.17	3.35	2.22
Cadmium																							
Dose/High TRV	0.017	1.68E-06	34.19	5.75E-05	0.017	20.10	0.060	1.21	0.0062	0.008	7.52	50.16	0.060	3.01	0.011	0.032	1.00	0.098	0.40	10.43	0.084	10.75	0.038
Dose/Low TRV	0.017	1.68E-06	34.19	5.75E-05	0.017	20.10	0.060	1.21	0.0062	0.008	7.52	50.16	0.060	3.01	0.011	0.032	1.00	0.098	0.40	0.080	0.80	0.05	7.69
Copper																							
Dose/High TRV	0.017	1.68E-06	76.18	1.28E-04	0.017	12.02	0.50	6.01	0.0062	0.037	3.05	20.31	0.50	10.16	0.011	0.11	1.00	0.098	1.49	52.26	0.41	39.25	0.04
Dose/Low TRV	0.017	1.68E-06	76.18	1.28E-04	0.017	12.02	0.50	6.01	0.0062	0.037	3.05	20.31	0.50	10.16	0.011	0.11	1.00	0.098	1.49	2.30	0.54	1.58	0.94
Lead																							
Dose/High TRV	0.017	1.68E-06	186.59	3.14E-04	0.017	15.78	0.10	1.58	0.0062	0.010	5.60	37.32	0.10	3.73	0.011	0.040	1.00	0.098	0.51	8.75	0.80	5.75	0.09
Dose/Low TRV	0.017	1.68E-06	186.59	3.14E-04	0.017	15.78	0.10	1.58	0.0062	0.010	5.60	37.32	0.10	3.73	0.011	0.040	1.00	0.098	0.51	0.014	0.084	0.014	35.25
Manganese																							
Dose/High TRV	0.017	1.68E-06	467.93	7.87E-04	0.017	56.15	NA	NA	0.0062	0.35	102.94	686.30	NA	NA	0.011	7.27	1.00	0.098	78.05	776.00	0.20	674.79	0.12
Dose/Low TRV	0.017	1.68E-06	467.93	7.87E-04	0.017	56.15	NA	NA	0.0062	0.35	102.94	686.30	NA	NA	0.011	7.27	1.00	0.098	78.05	77.60	0.20	67.48	1.16
Mercury																							
Dose/High TRV	0.017	1.68E-06	6.76	1.14E-05	0.017	0.22	NA	NA	0.0062	0.0013	0.27	1.80	NA	NA	0.011	0.019	1.00	0.098	0.21	0.18	1.00	0.11	1.85
Dose/Low TRV	0.017	1.68E-06	6.76	1.14E-05	0.017	0.22	NA	NA	0.0062	0.0013	0.27	1.80	NA	NA	0.011	0.019	1.00	0.098	0.21	0.039	1.00	0.024	8.55
Selenium																							
Dose/High TRV	0.017	1.68E-06	16.70	2.81E-05	0.017	13.80	0.60	8.28	0.0062	0.052	3.67	24.47	0.60	14.68	0.011	0.16	1.00	0.098	2.12	0.93	1.11	0.57	3.71
Dose/Low TRV	0.017	1.68E-06	16.70	2.81E-05	0.017	13.80	0.60	8.28	0.0062	0.052	3.67	24.47	0.60	14.68	0.011	0.16	1.00	0.098	2.12	0.23	1.11	0.14	14.98
Zinc																							
Dose/High TRV	0.017	1.68E-06	197.77	3.33E-04	0.017	132.27	0.50	66.14	0.0062	0.41	110.75	738.34	0.50	369.17	0.011	3.91	1.00	0.098	44.27	172.00	0.96	109.02	0.41
Dose/Low TRV	0.017	1.68E-06	197.77	3.33E-04	0.017	132.27	0.50	66.14	0.0062	0.41	110.75	738.34	0.50	369.17	0.011	3.91	1.00	0.098	44.27	17.20	0.96	10.90	4.06
Total DDTs																							
Dose/High TRV	0.017	1.68E-06	0.016	2.69E-08	0.017	0.00015	NA	NA	0.0062	9.33E-07	0.13	0.90	NA	NA	0.011	0.0095	1.00	0.098	0.10	NA	NA	NA	No TRV [18]
Dose/Low TRV	0.017	1.68E-06	0.016	2.69E-08	0.017	0.00015	NA	NA	0.0062	9.33E-07	0.13	0.90	NA	NA	0.011	0.0095	1.00	0.098	0.10	0.0090	3.50	0.0044	22.10

Notes: Highlighted cells indicate HQs greater than 1.0.

95UCL 95 percent upper confidence limit on the arithmetic mean
COPEC Chemical of potential ecological concern
HQ Hazard quotient
kg Kilogram
kg/day Kilogram per day
mg/kg Milligram per kilogram
mg/day Milligram per day
mg/kg/day Milligram per kilogram per day
SUF Site use factor
TRV Toxicity Reference Value

1 Total ingestion rate was calculated with body weight using the Nagy and others (1999) metabolic rate equation for passerines and the food requirement conversion for omnivores. The soil and prey ingestion rates are expressed as a percentage of the total ingestion rate.
2 Soil ingestion rate based on Western Meadowlark soil ingestion rate in EPA (1999). The soil ingestion rate is expressed as a 0.01 percent of the total ingestion rate.
3 Soil concentration equals the 95UCL of all site-collected soil samples.
4 Soil daily dose was calculated by multiplying the soil ingestion rate (see note 2) by soil concentration (see note 3).
5 Total prey ingestion rate was 99.99 percent of the total ingestion rate, based on the soil ingestion rate (see note 2). The prey was assumed to consist of 37 percent plant and 63 percent invertebrates.
6 Plant concentration equals the 95UCL of arsenic, cadmium, copper, lead, selenium, and zinc measured in all site-collected plant tissue samples. For all other chemicals, the recommended BAF in dry weight cited in EPA (1998, 1999) and Sample and Arenal (1999) multiplied by the 95UCL soil concentration was used.
7 Plant ingestion rate was calculated by multiplying the total prey ingestion rate (see note 5) by 0.37.
8 Plant daily dose was calculated by multiplying plant ingestion rate (see note 7) by the 95UCL plant concentration (see note 6).
9 Invertebrate concentration equals the 95UCL of arsenic, cadmium, copper, lead, selenium, and zinc measured in all site-collected invertebrate tissue samples. For all other chemicals, the 95UCL in site-collected soil multiplied by the recommended BAF in wet weight cited in EPA (1999) for invertebrate tissue samples was used.
10 Invertebrate concentrations were converted to dry weight using the formula: dry weight concentration = (wet weight concentration)/(1-percent moisture in media). Average percent moisture for earthworm tissue equals 85 percent (EPA 1993). Plant BAFs and site-collected concentrations wer
11 Invertebrate ingestion rate was calculated by multiplying the total prey ingestion rate (see note 5) by 0.63.
12 Invertebrate daily dose was calculated by multiplying invertebrate ingestion rate (see note 11) by the maximum invertebrate concentration (see note 9).
13 Average weight of males and females from Dunning (1993).
14 Total daily dose is calculated using the following equation: total daily dose = (plant daily dose + invertebrate daily dose + soil daily dose)*SUF/receptor species body weight.
15 The derivation of TRVs is described in EPA WEST (1998). These TRVs are adjusted to incorporate uncertainty factors.
16 Allometrically adjusted TRVs were calculated using the following equation: receptor species TRV = (test species TRV) x (test species body weight / receptor species body weight)
17 The HQ was calculated using total daily dose / allometrically adjusted TRV.
18 Sufficient data are not available to derive a TRV. This chemical was evaluated qualitatively.

TABLE 20

FOCUSED ASSESSMENT FOOD CHAIN MODEL FOR THE NORTHERN HARRIER
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

COPEC	Total Ingestion Rate[1] (kg/day)	Soil Ingestion Rate[1,2] (kg/day)	Soil Concentration (mg/kg)[3]	Soil Daily Dose[4] (mg/day)	Prey Ingestion Rate[1,5] (kg/day)	Prey Concentration Wet Weight (mg/kg)[6]	Prey Concentration Dry Weight (mg/kg)[7]	Tissue Bioavailability Ratio	Prey Concentration Adjusted for Bioavailability	Prey Daily Dose[8] (mg/day)	SUF[9]	Body Weight[10] (kg)	Total Daily Dose[11] (mg/kg/day)	TRV[12] (mg/kg/day)	Test Species Body Weight (kg)	Allometrically Adjusted TRV[13] (mg/kg/day)	HQ[14] (based on adjusted TRV)
Cadmium																	
Dose/High TRV	0.037	2.58E-04	34.19	0.0088	0.037	1.06	3.31	0.060	0.20	0.0073	0.57	0.44	0.021	10.43	0.084	14.5	0.0014
Dose/Low TRV	0.037	2.58E-04	34.19	0.0088	0.037	1.06	3.31	0.060	0.20	0.0073	0.57	0.44	0.021	0.080	0.80	0.071	0.29
Copper																	
Dose/High TRV	0.037	2.58E-04	76.18	0.020	0.037	31.80	99.38	0.50	49.7	1.82	0.57	0.44	2.38	52.26	0.41	53.05	0.045
Dose/Low TRV	0.037	2.58E-04	76.18	0.020	0.037	31.80	99.38	0.50	49.7	1.82	0.57	0.44	2.38	2.30	0.64	2.14	1.11
Lead																	
Dose/High TRV	0.037	2.58E-04	186.59	0.048	0.037	2.80	8.75	0.10	0.88	0.032	0.57	0.44	0.10	8.75	0.80	7.77	0.013
Dose/Low TRV	0.037	2.58E-04	186.59	0.048	0.037	2.80	8.75	0.10	0.88	0.032	0.57	0.44	0.10	0.014	0.084	0.020	5.32
Mercury																	
Dose/High TRV	0.037	2.58E-04	6.76	0.0017	0.037	0.010	0.031	NA	NA	0.0011	0.57	0.44	0.0037	0.18	1.00	0.15	0.024
Dose/Low TRV	0.037	2.58E-04	6.76	0.0017	0.037	0.010	0.031	NA	NA	0.0011	0.57	0.44	0.0037	0.039	1.00	0.033	0.11
Selenium																	
Dose/High TRV	0.037	2.58E-04	16.72	0.0043	0.037	7.26	22.69	0.60	13.61	0.50	0.57	0.44	0.65	0.93	1.11	0.77	0.84
Dose/Low TRV	0.037	2.58E-04	16.72	0.0043	0.037	7.26	22.69	0.60	13.61	0.50	0.57	0.44	0.65	0.23	1.11	0.19	3.40
Zinc																	
Dose/High TRV	0.037	2.58E-04	197.8	0.051	0.037	103.60	323.75	0.50	161.88	5.93	0.57	0.44	7.73	172.00	0.96	147.37	0.052
Dose/Low TRV	0.037	2.58E-04	197.8	0.051	0.037	103.60	323.75	0.50	161.88	5.93	0.57	0.44	7.73	17.20	0.96	14.74	0.52

Notes: Highlighted cells indicate HQs greater than 1.0.

COPEC Chemical of potential ecological concern
HQ Hazard quotient
mg/kg Milligram per kilogram
kg/day Kilogram per day
mg/kg/day Milligram per kilogram per day
NA Not applicable
SUF Site use factor
TRV Toxicity reference value

1 Total ingestion rate was calculated with body weight using the Nagy and others (1999) metabolic rate equation for all birds and the food requirement conversion for insectivorous birds. The soil and prey ingestion rates are expressed as a percentage of the total ingestion rate.

2 Soil ingestion rate based on Bald Eagle soil ingestion rate in Pascoe and others (1996). The soil ingestion rate is expressed as a 0.7 percent of the total ingestion rate.

3 Soil concentration equals the 95UCL of all site-collected soil samples.

4 Soil daily dose was calculated by multiplying the soil ingestion rate (see note 2) by the 95UCL (see note 3) soil concentration.

5 Total prey ingestion rate was 99.3 percent of the total ingestion rate, based on the soil ingestion rate (see note 2). The prey was assumed to consist of 100 percent rodents.

6 Prey concentrations for arsenic, cadmium, copper, lead, mercury, selenium, and zinc were based on the summation of individual 95UCL metal concentrations measured in liver and kidney tissue of three rodent species (California vole, house mouse, deer mouse) collected from RASS 4. For all other chemicals, the recommended BAF in wet weight cited in EPA (1998, 1999) was multiplied by the 95UCL soil concentration to derive prey concentration.

7 Rodent concentrations were converted to dry weight using the formula: dry weight concentration = (wet weight concentration)/(1-percent moisture in media). Average percent moisture for rodent tissue equals 68 percent (EPA 1993).

8 Prey daily dose was calculated by multiplying prey ingestion rate (see note 5) by 95UCL prey concentration (see note 6).

9 A refined SUF was calculated using the following equation: SUF = area of study site/area used by receptor. SUF was calculated using the lowest home range (30 acres) cited in the literature from females in Davi, California (Zeiner and others 1990a). Refined SUF = 17 acres/30 acres = 0.57.

10 Average weight of males and females from Dunning (1993).

11 Total daily dose is calculated using the following equation: [(prey daily dose + soil daily dose)*SUF] / receptor species body weight.

12 The derivation of TRVs is described in EFA WEST (1998). These TRVs are adjusted to incorporate uncertainty factors.

13 Allometrically adjusted TRVs were calculated using the following equation: receptor species TRV = (test species TRV) x (test species body weight / receptor species body weight)$^{(1-1.2)}$.

TABLE 21

FOCUSED ASSESSMENT FOOD CHAIN MODELFOR THE WESTERN MEADOWLARK
PRELIMINARY ASSESSMENT ADDENDUM, AREA OF CONCERN 1, NWSSBD CONCORD

COPEC	Total Ingestion Rate[1] (kg/day)	Soil Ingestion Rate[1,2] (kg/day)	Soil Concentration (mg/kg)[3]	Soil Daily Dose[4] (mg/day)	Prey Ingestion Rate[1,5] (kg/day)	Prey Concentration Wet Weight (mg/kg)[6]	Prey Concentration Dry Weight (mg/kg)[7]	Tissue Bioavailability Ratio	Prey Concentration Adjusted for Bioavailability	Prey Daily Dose[8] (mg/day)	SUF[9]	Body Weight[10] (kg)	Total Daily Dose[11] (mg/kg/day)	TRV[12] (mg/kg/day)	Test Species Body Weight (kg)	Allometrically Adjusted TRV[13] (mg/kg/day)	HQ[14] (based on adjusted TRV)
Arsenic																	
Dose/High TRV	0.18	0.0050	91.52	0.45	0.17	0.46	1.44	0.98	1.41	0.24	0.053	3.88	0.0096	4.70	0.11	3.80	0.0025
Dose/Low TRV	0.18	0.0050	91.52	0.45	0.17	0.46	1.44	0.98	1.41	0.24	0.053	3.88	0.0095	0.32	0.33	0.28	0.034
Cadmium																	
Dose/High TRV	0.18	0.0050	34.19	0.17	0.17	0.32	0.98	0.060	0.059	0.010	0.053	3.88	0.0025	2.64	0.031	1.98	0.0012
Dose/Low TRV	0.18	0.0050	34.19	0.17	0.17	0.32	0.98	0.060	0.059	0.010	0.053	3.88	0.0025	0.060	0.032	0.045	0.055
Copper																	
Dose/High TRV	0.18	0.0050	76.18	0.38	0.17	29.76	93.01	0.50	46.50	8.01	0.053	3.88	0.11	631.58	0.025	466.29	2.46E-04
Dose/Low TRV	0.18	0.0050	76.18	0.38	0.17	29.76	93.01	0.50	46.50	8.01	0.053	3.88	0.11	2.67	0.030	1.99	0.057
Lead																	
Dose/High TRV	0.18	0.0050	186.59	0.93	0.17	3.63	11.35	0.10	1.14	0.20	0.053	3.88	0.015	241	0.019	174.72	8.77E-05
Dose/Low TRV	0.18	0.0050	186.59	0.93	0.17	3.63	11.35	0.10	1.14	0.20	0.053	3.88	0.015	0.0015	0.21	0.0013	12.18
Mercury																	
Dose/High TRV	0.18	0.0050	6.76	0.034	0.17	5.08E-05	1.59E-04	NA	1.59E-04	2.74E-05	0.053	3.88	4.59E-04	0.27	0.80	0.25	0.0019
Dose/Low TRV	0.18	0.0050	6.76	0.034	0.17	5.08E-05	1.59E-04	NA	1.59E-04	2.74E-05	0.053	3.88	4.59E-04	0.027	0.80	0.025	0.019
Selenium																	
Dose/High TRV	0.18	0.0050	16.72	0.083	0.17	2.54	7.94	0.60	4.76	0.82	0.053	3.88	0.012	1.21	0.025	0.89	0.014
Dose/Low TRV	0.18	0.0050	16.72	0.083	0.17	2.54	7.94	0.60	4.76	0.82	0.053	3.88	0.012	0.050	0.19	0.042	0.30
Zinc																	
Dose/High TRV	0.18	0.0050	197.77	0.98	0.17	187.61	586.30	0.50	293.15	50.52	0.053	3.88	0.70	411.43	0.18	341.62	0.0021
Dose/Low TRV	0.18	0.0050	197.77	0.98	0.17	187.61	586.30	0.50	293.15	50.52	0.053	3.88	0.70	9.60	0.026	7.10	0.099
Aldrin																	
Dose/High TRV	0.18	0.0050	0.0020	9.93E-06	0.17	0.70	2.19	NA	NA	0.38	0.053	3.88	0.0051	1.00	0.065	0.78	0.0066
Dose/Low TRV	0.18	0.0050	0.0020	9.93E-06	0.17	0.70	2.19	NA	NA	0.38	0.053	3.88	0.0051	0.10	0.065	0.078	0.066

Notes:

COPEC Chemical of potential ecological concern
HQ Hazard quotient
kg Kilogram
mg/kg Milligram per kilogram
kg/day Kilogram per day
mg/kg/day Milligram per kilogram per day
NA Not applicable
SUF Site use factor
TRV Toxicity reference value

1 Total ingestion rate was calculated with body weight using the Nagy and others (1999) metabolic rate equation for eutherian mammals and the food requirement conversion for omnivores. The soil and prey ingestion rates are expressed as a percentage of the total ingestion rate.

2 Soil ingestion rate based on red fox soil ingestion rate in Beyer and others (1994). The soil ingestion rate is expressed as a 2.8 percent of the total ingestion rate.

3 Soil concentration equals the 95UCL of all site-collected soil samples.

4 Soil daily dose was calculated by multiplying the soil ingestion rate (see note 2) by the 95UCL (see note 3) soil concentration.

5 Total prey ingestion rate was 97.2 percent of the total ingestion rate, based on the soil ingestion rate (see note 2). The prey was assumed to consist of 100 percent rodents.

6 Prey concentrations for arsenic, cadmium, copper, lead, mercury, selenium, and zinc were based on the summation of individual 95UCL metal concentrations measured in femur, liver, and kidney tissue of three rodent species collected from RASS 4.
Prey concentrations for other COPECs are recommended values derived from bioaccumulation factors published by EPA (1999) multiplied by the 95UCL soil concentration.

7 Rodent concentrations were converted to dry weight using the formula: dry weight concentration = (wet weight concentration)/(1-percent moisture in media). Average percent moisture for rodent tissue equals 68 percent (EPA 1993).

8 Prey daily dose was calculated by multiplying prey ingestion rate (see note 5) by 95UCL prey concentration (see note 6).

9 A refined SUF was calculated using the following equation: SUF = area of study site/area used by receptor. SUF was calculated using the lowest home range (320 acres) cited in the literature from females in Davi, California (Zeiner and others 1990a). Refined SUF = 17 acres/320 acres = 0.053.

10 Average adult weight from EPA (1993) and Silva and Downing (1995).

11 Total daily dose is calculated using the following equation: [(prey daily dose + soil daily dose)*SUF] / receptor species body weight.

12 The derivation of TRVs is described in EFA WEST (1998). These TRVs are adjusted to incorporate uncertainty factors.

13 Allometrically adjusted TRVs were calculated using the following equation: receptor species TRV = (test species TRV) x (test species body weight / receptor species body weight)$^{(1-0.94)}$.

14 The HQ was calculated using total daily dose/allometrically adjusted TRV.

DS.0267.17348

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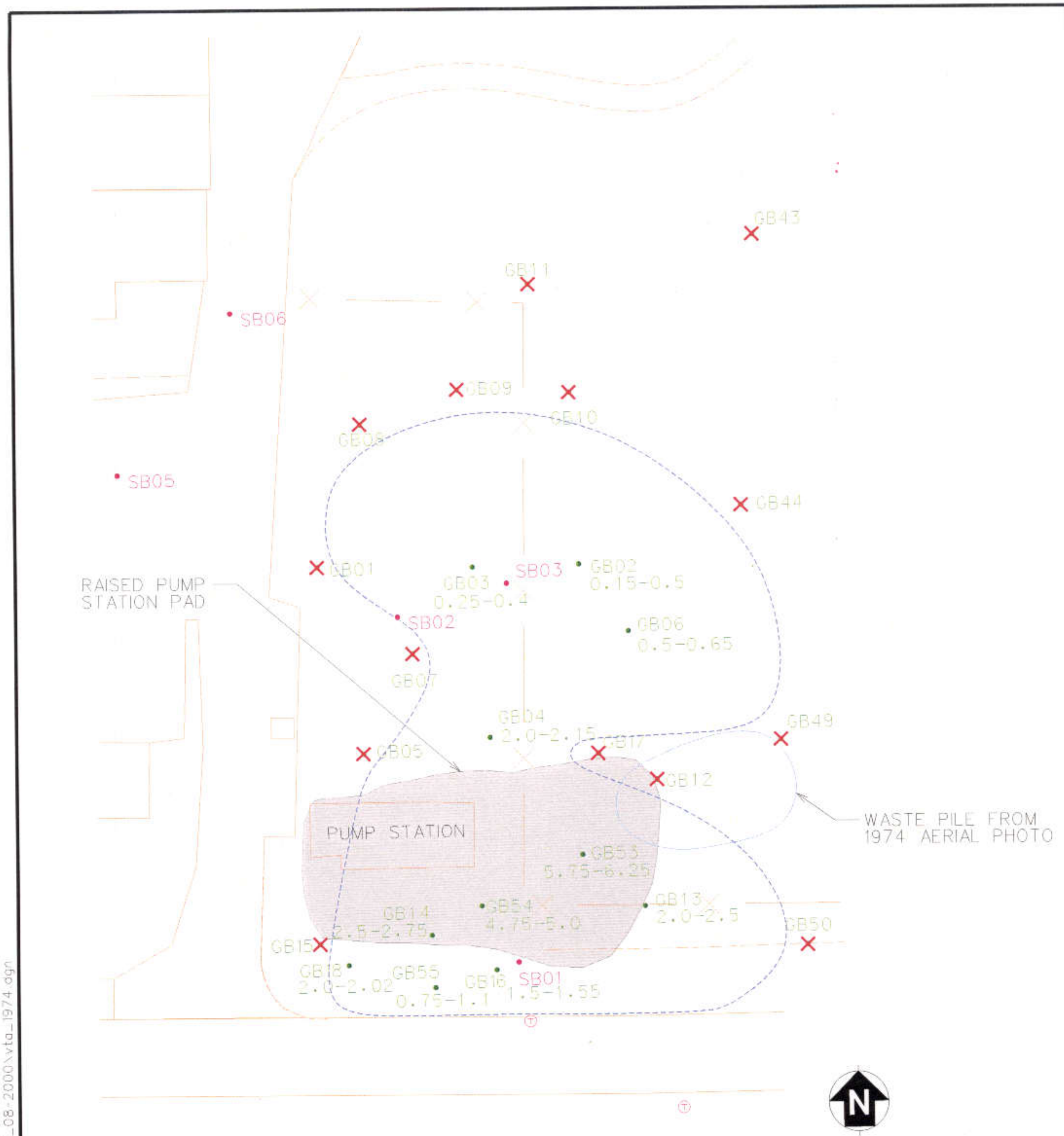
Tetra Tech EM Inc.

NAVAL WEAPONS STATION
SEAL BEACH DETACHMENT
CONCORD, CALIFORNIA

FIGURE 1

1974 AERIAL PHOTOGRAPH
AND SITE FEATURES

DS.0267.17348



30' 0 30' 60' Feet

LEGEND:

SB05	SAMPLING LOCATION (FEBRUARY 1999)
GB03 0.25-0.4	SAMPLING LOCATION AND DEPTH INTERVAL OF CINDER MATERIALS (FEET)
×	SAMPLING LOCATION WHERE NO CINDER MATERIAL WAS DETECTED
	AREA WHERE CINDER MATERIAL WAS DETECTED
	TELEPHONE POLE

Tetra Tech EM Inc.

NAVAL WEAPONS STATION
SEAL BEACH DETACHMENT
CONCORD, CALIFORNIA

FIGURE 2

AERIAL DISTRIBUTION OF
CINDER ROADBED MATERIAL

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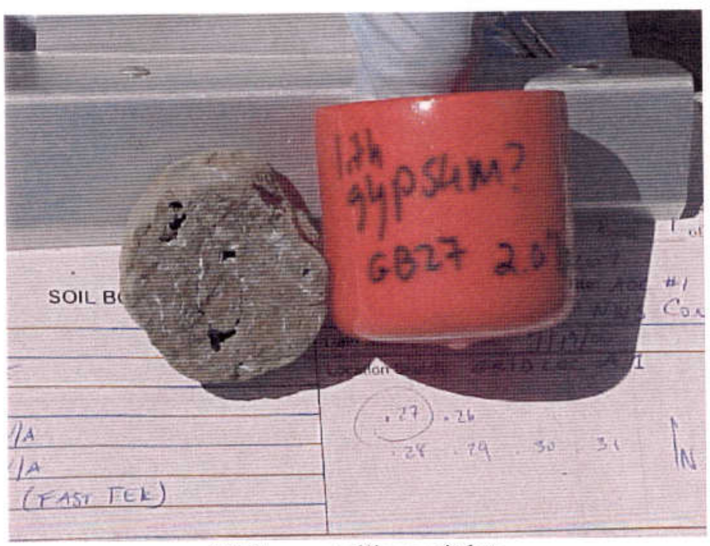
DS.0267.17348

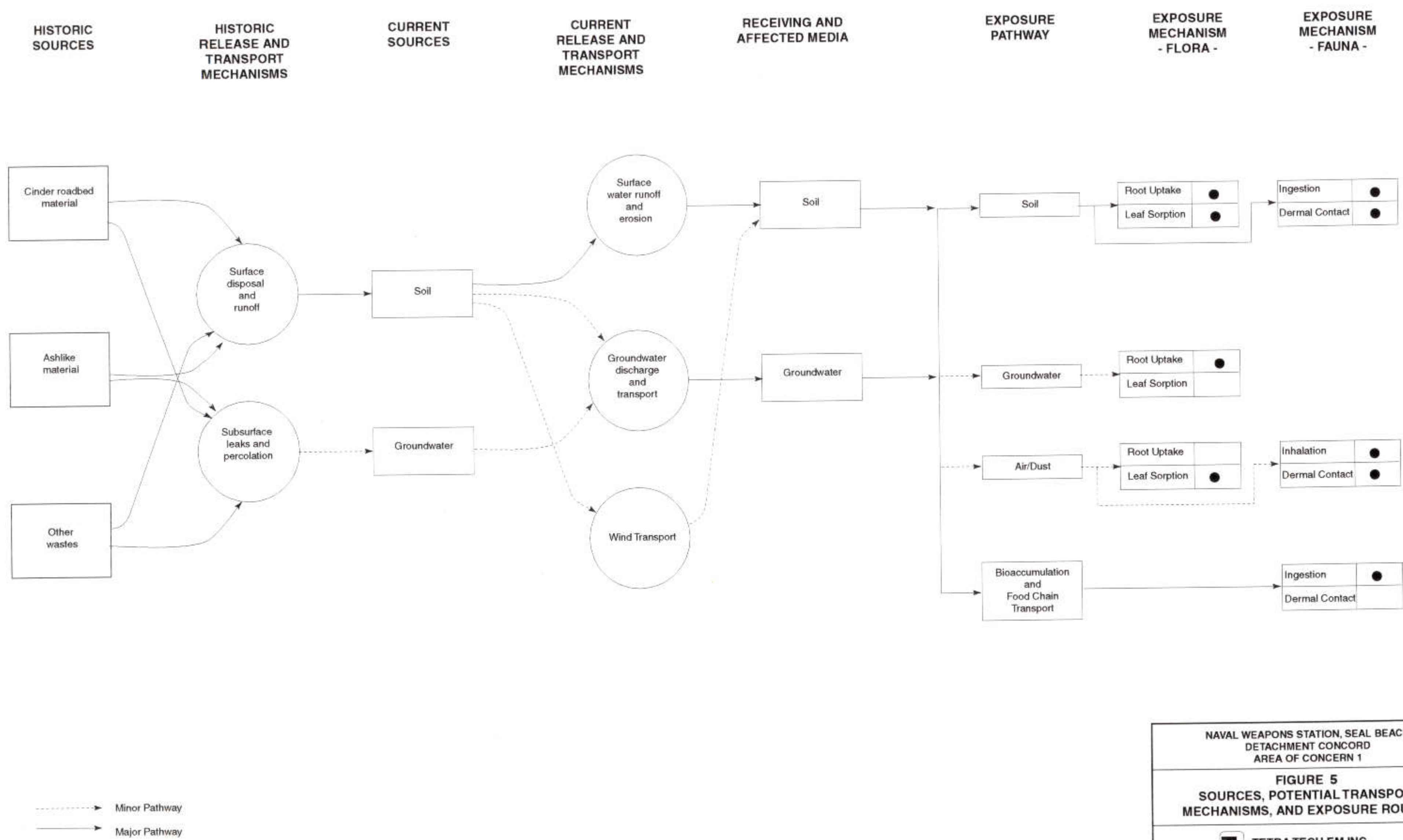
Cinder roadbed material

White powdery materials



White crystalline veinlets

FIGURE 3: PHOTOGRAPHS OF WASTE MATERIALS AT AREA OF CONCERN 1

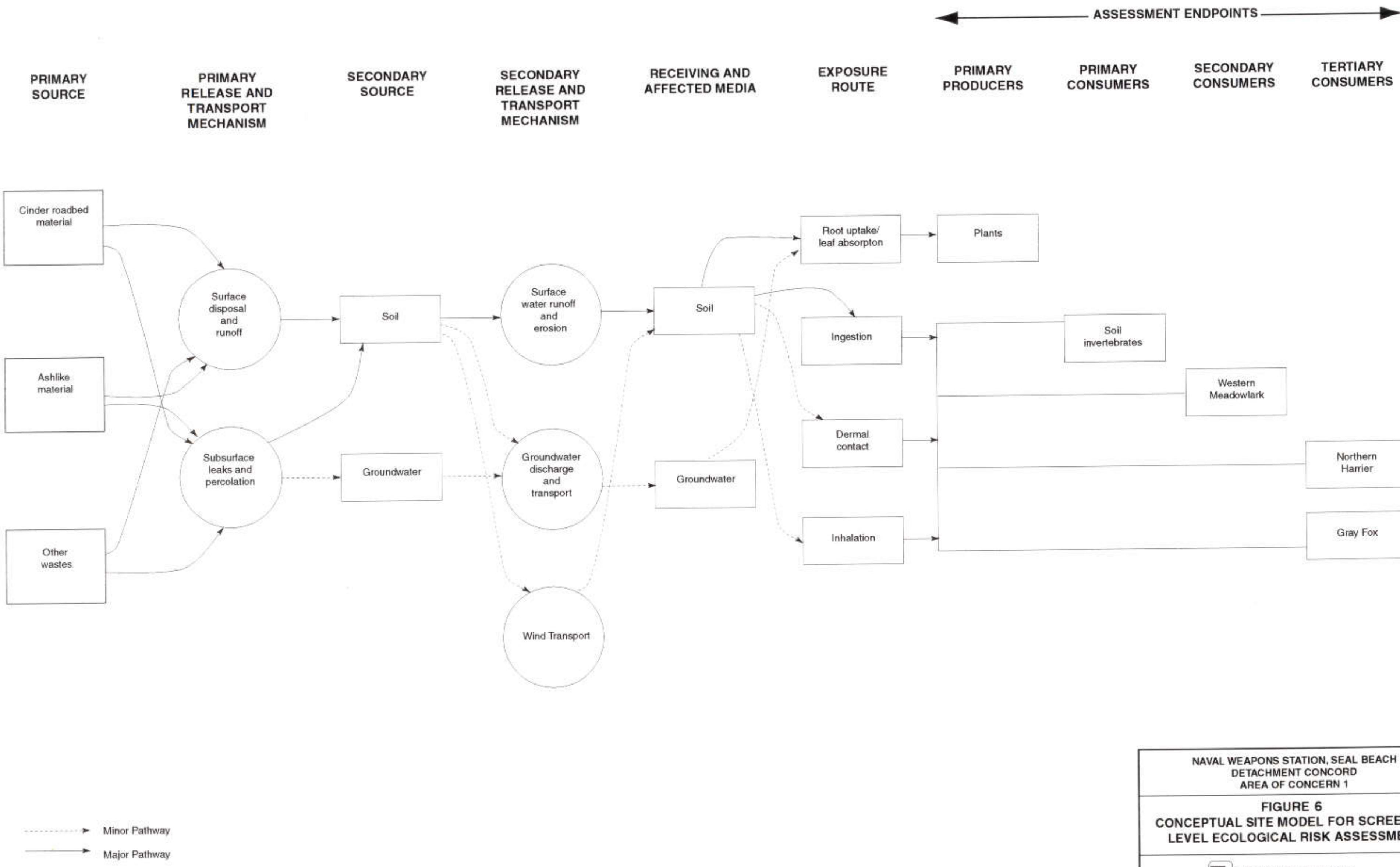


NAVAL WEAPONS STATION, SEAL BEACH
DETACHMENT CONCORD
AREA OF CONCERN 1

FIGURE 5
SOURCES, POTENTIAL TRANSPORT MECHANISMS, AND EXPOSURE ROUTES

TETRA TECH EM INC.

DS.0267.17348



NAVAL WEAPONS STATION, SEAL BEACH
DETACHMENT CONCORD
AREA OF CONCERN 1

FIGURE 6
CONCEPTUAL SITE MODEL FOR SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT

TETRA TECH EM INC.

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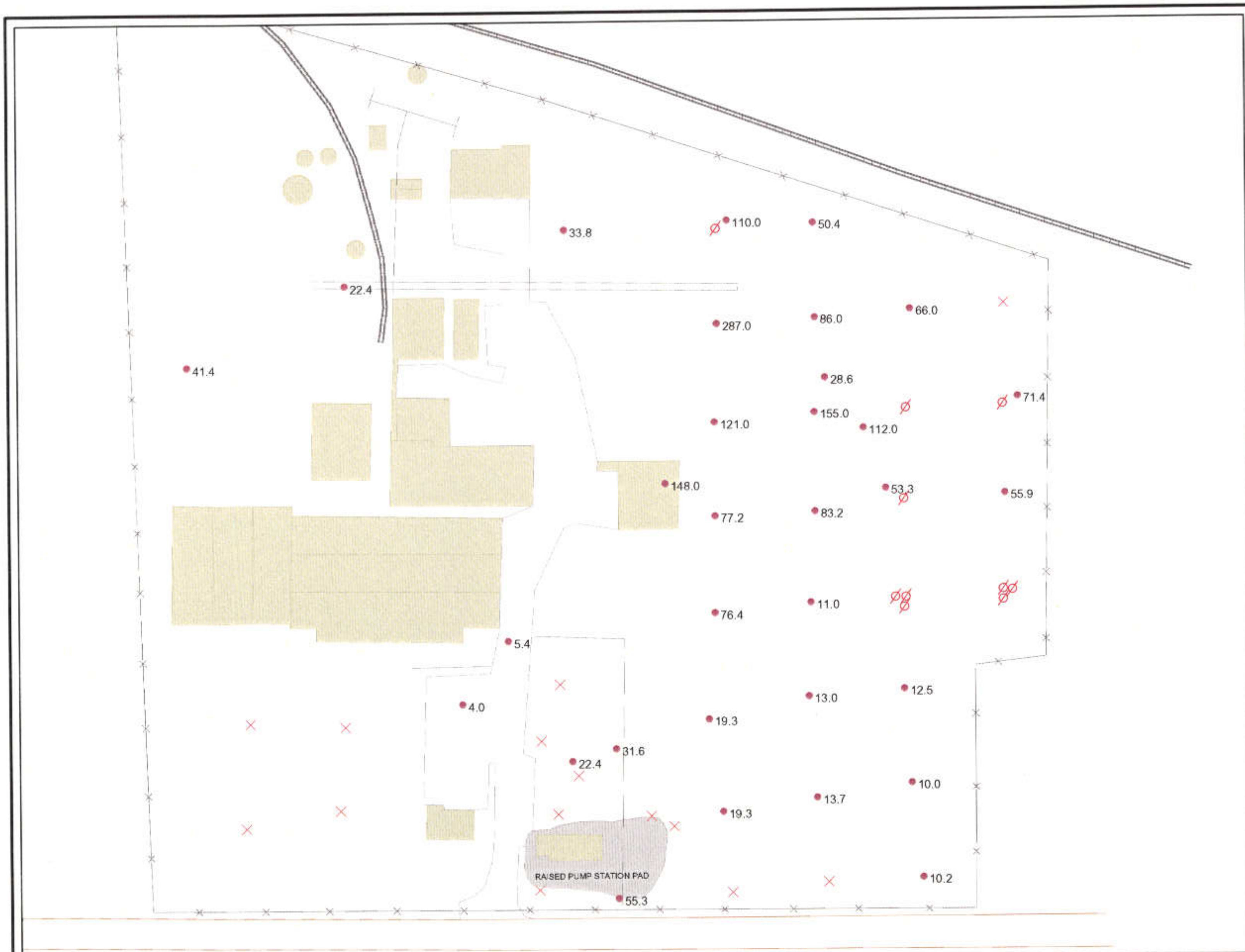

28.6 Maximum arsenic concentration in upper 2 feet of soil (mg/Kg)

× Sampling location where no waste was encountered.

ø Geoprobe boring refusal.

NOTE: Site features from 1974 aerial photograph are shown in green.

50 0 50 100 Feet

Tetra Tech EM Inc.

NAVAL WEAPONS STATION
SEAL BEACH DETACHMENT
CONCORD, CALIFORNIA

FIGURE 7

LATERAL DISTRIBUTION OF ARSENIC IN UPPERMOST 2 FEET OF SOIL

DS.0267.17348

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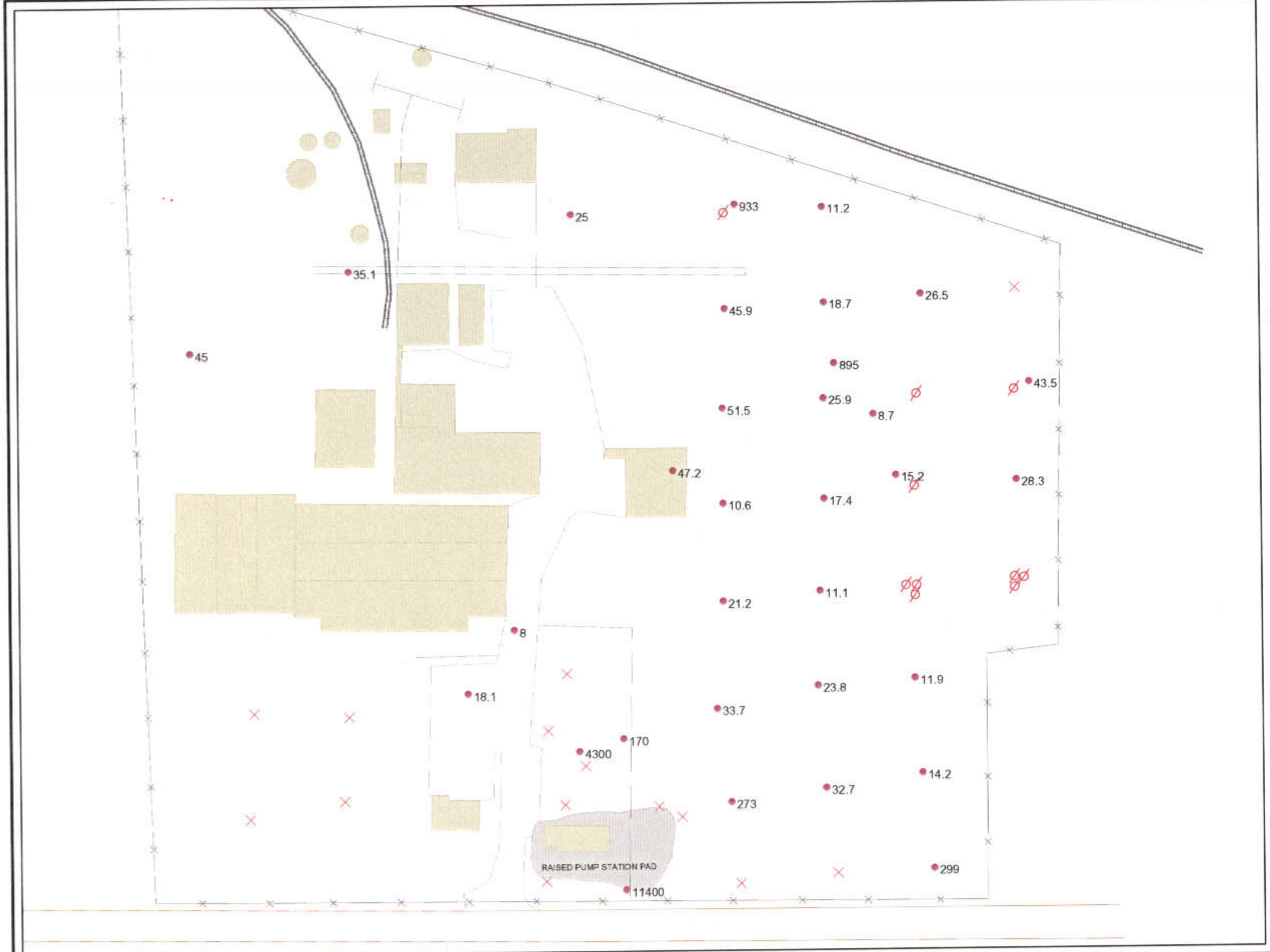
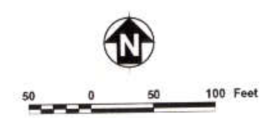


28.6 Maximum lead concentration in upper 2 feet of soil (mg/Kg)

Sampling location where no waste was encountered.

Geoprobe boring refusal.

NOTE: Site features from 1974 aerial photograph are shown in green.



Tetra Tech EM Inc.

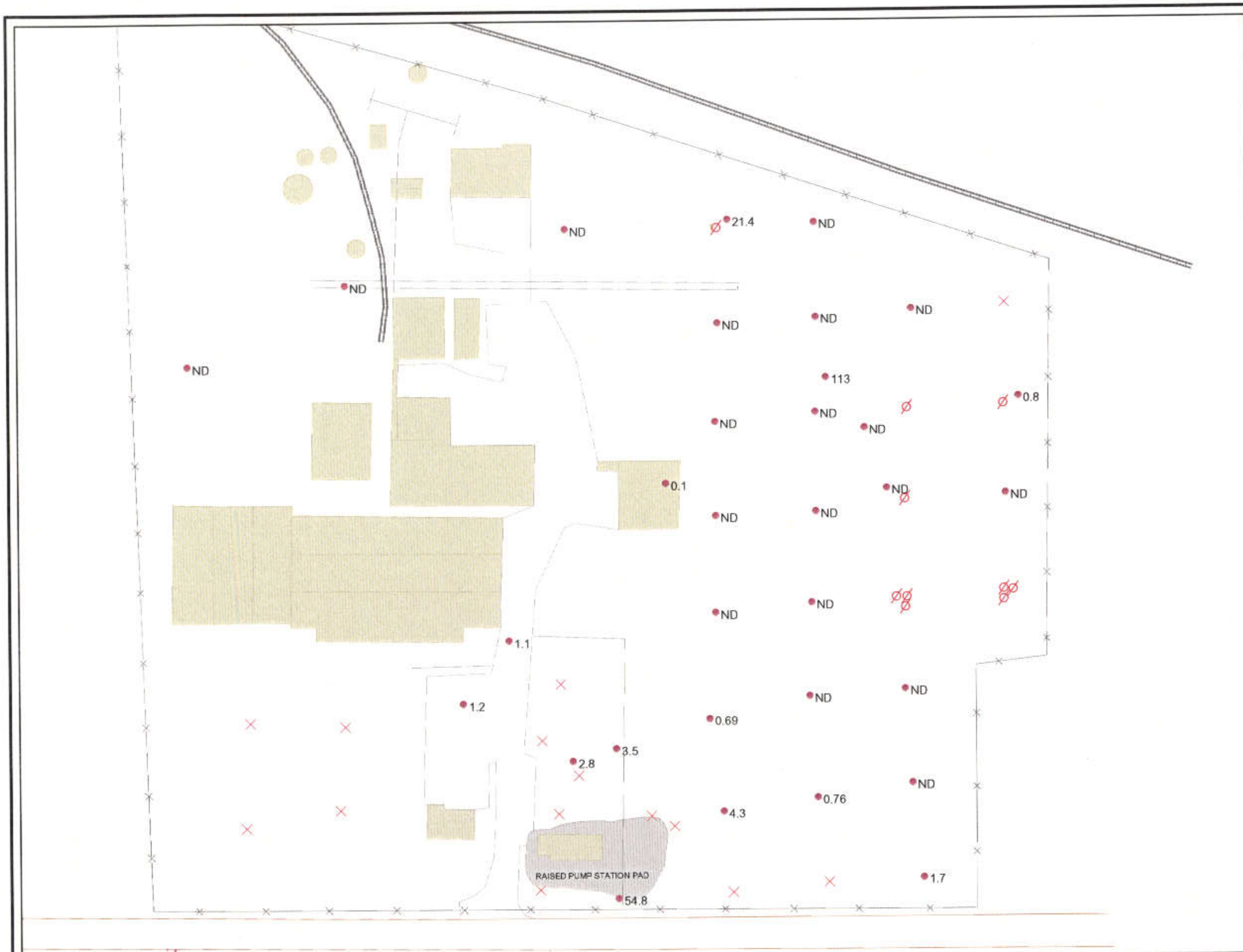
NAVAL WEAPONS STATION
SEAL BEACH DETACHMENT
CONCORD, CALIFORNIA

FIGURE 8

LATERAL DISTRIBUTION OF
LEAD
IN UPPERMOST 2 FEET OF SOIL

DS.0267.17348

04/04/2001 J:\concord1\ArcView\Projects\AOC1_cto267\Proj1.apr TtEMI-SF AZ



• 28.6 Maximum mercury concentration in upper 2 feet of soil (mg/Kg)

× Sampling location where no waste was encountered.

Ø Geoprobe boring refusal.

NOTE: Site features from 1974 aerial photograph are shown in green.

50 0 50 100 Feet

Tetra Tech EM Inc.

NAVAL WEAPONS STATION
SEAL BEACH DETACHMENT
CONCORD, CALIFORNIA

FIGURE 9

LATERAL DISTRIBUTION OF MERCURY IN UPPERMOST 2 FEET OF SOIL

DS.0267.17348

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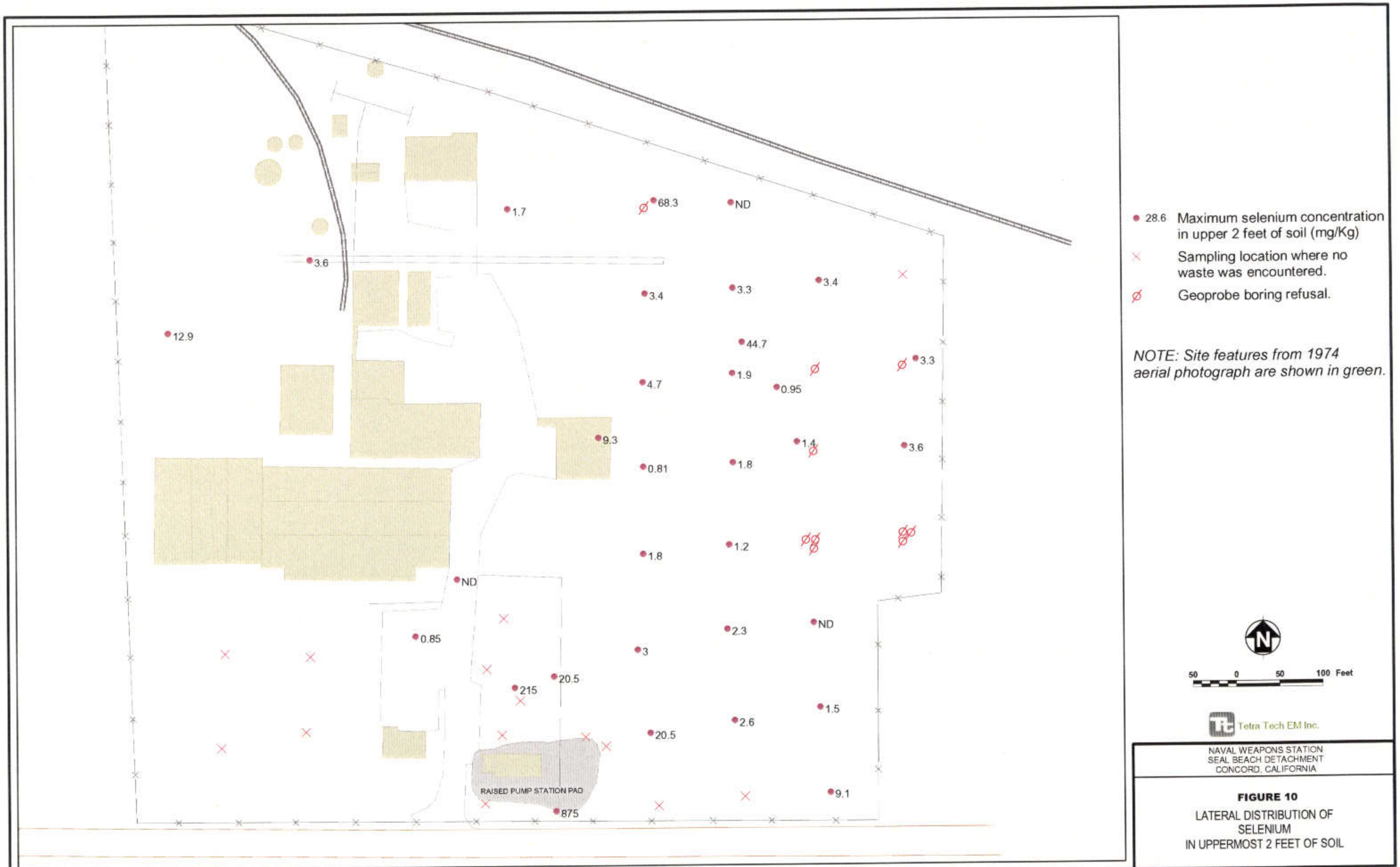

NAVAL WEAPONS STATION
SEAL BEACH DETACHMENT
CONCORD, CALIFORNIA

FIGURE 10

LATERAL DISTRIBUTION OF SELENIUM IN UPPERMOST 2 FEET OF SOIL

DS.0267.17348

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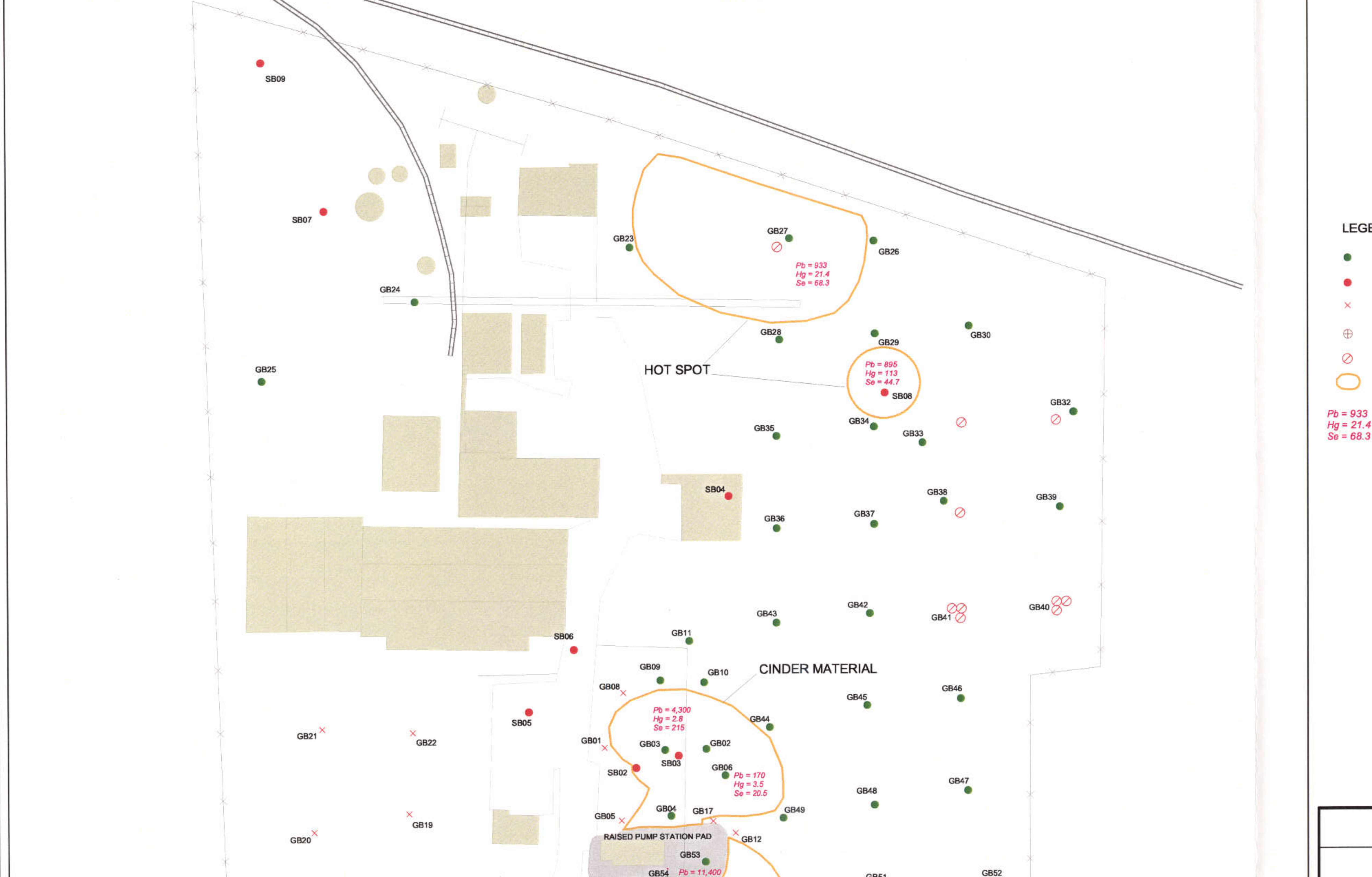
LEGEND:

SB08

GB03



SB09
SB07
GB24
GB25
GB23
GB27
GB26
Pb = 933
Hg = 21.4
Se = 68.3
GB28
GB29
GB30
HOT SPOT
Pb = 895
Hg = 113
Se = 44.7
SB08
GB32
GB34
GB33
GB35
SB04
GB38
GB39
GB36
GB37
GB43
GB42
GB41
GB40
SB06
GB11
GB09
GB10
CINDER MATERIAL
GB46
GB08
GB45
SB05
Pb = 4,300
Hg = 2.8
Se = 215
GB44
GB21
GB22
GB01
GB03
GB02
SB03
GB06
SB02
Pb = 170
Hg = 3.5
Se = 20.5
GB48
GB47
GB05
GB04
GB17
GB49
GB19
GB20
RAISED PUMP STATION PAD
GB12
GB53
GB54
Pb = 11,400
GB52
LEGE
Pb = 933
Hg = 21.4
Se = 68.3